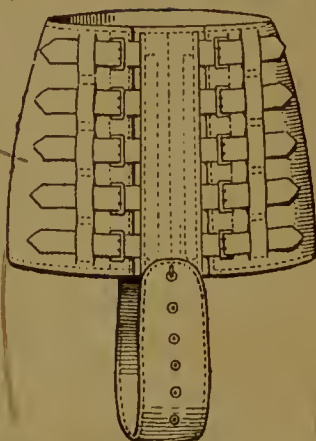




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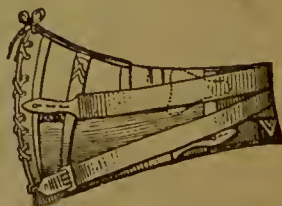
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*A Guide to Attendance on Natural Labour for
Medical Students and Midwives*

BY

G. ERNEST HERMAN

M.B. (LOND.), F.R.C.P.

SENIOR OBSTETRIC PHYSICIAN TO THE LONDON HOSPITAL, AND LECTURER
ON MIDWIFERY ;
LATE EXAMINER IN MIDWIFERY TO THE UNIVERSITIES OF LONDON AND
OXFORD, THE VICTORIA UNIVERSITY, MANCHESTER, AND THE
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OF BEING ASSOCIATED IN THE
MANAGEMENT OF THE GENERAL LYING-IN HOSPITAL,

JOHN WILLIAMS,

F. H. CHAMPNEYS,

C. J. CULLINGWORTH,

AND

ROBERT BOXALL,

I DEDICATE THIS BOOK.

P R E F A C E.

THE duties of a student in attendance upon his first cases of labour are the same as those of a midwife. The design of this book is to give both such elementary knowledge as is needed for the safe management of natural labour. To meet the requirements of the midwife, a chapter on anatomy has been prefixed ; and in various places some elementary information has been given which a medical student does not need : these, it is hoped, the student will pardon.

I have to thank Messrs. J. and A. Churchill, Smith, Elder and Co., and other publishers, for the use of blocks for illustrations. Figs. 13, 14, 72, 73, 74, 75, 76, 77, and 79 have been drawn specially for this work by Mr. Berjeau. Figs. 51 to 58, and Fig. 60 have been copied on a reduced scale from the drawings by Farabeuf, in the "*Introduction à l'Étude des Accouchements*," by Farabeuf and Varnier. For the convenience of the reader, some of the woodcuts appear more than once.

I have to thank Dr. Cullingworth for kindly reading the proof-sheets, and for making some valuable suggestions.

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MIDWIFERY.

CHAPTER I.

ANATOMICAL.

Position of uterus.—At the full term of pregnancy the womb reaches as high in the abdomen as the ensiform cartilage (tip of the breast-bone). When the woman is lying on her back it forms an angle of about 30 degrees with the ground. When she is standing it slopes so that it forms an angle of about 60 degrees with the ground, and its weight chiefly rests on the anterior abdominal wall, without the support of which the uterus would fall forward (Fig. 1). When the abdominal walls are very relaxed it does fall forward, and this condition is called “pendulous belly.” The stomach and bowels are above and behind the uterus.

The membranes.—The uterus is lined by the membranes, which contain a fluid called the liquor amnii, or “the waters.” There are three membranes: but the outer one, the *decidua*, is so thin and fragile that you need not trouble to look for it. Of the two that are important, the inner, called the *amnion*, is the stronger of the two. It passes over the placenta, from off which it can be quite stripped, and is firmly attached to the umbilical cord. The outer is the *chorion*, and with it the decidua is practically blended. It is attached to the edge of the placenta. It is softer than the amnion, and therefore it sometimes happens that a bit of it is torn off and retained in the uterus after labour. The chorion and amnion are fœtal membranes. The amnion has no connection with the



Fig. 1.—Showing the Position of the Uterus at the full Term of Pregnancy. (From Turnier.)

uterus. The bag of membranes usually contains enough fluid for the child to move about freely in it.

Difference between body and neck of uterus.—The uterus consists of two parts : the body, and the cervix or neck. The bag of membranes containing the “waters” and the child is, during pregnancy,



Fig. 2.—Showing the Difference between the Body and Neck of the Womb. The child is seen lying in the *body* of the womb. The *neck* of the womb is a canal leading to the body.

entirely in the *body* of the womb. The *neck* of the womb throughout pregnancy is closed (Fig. 2). It forms a canal a little more than an inch long, the upper opening of which is called the internal os, the lower the external os. The placenta is never attached to the neck of the womb. The child is nourished by and breathes through the placenta.

The placenta.—The placenta is attached to the inside of the womb, and large arteries and veins bring to it and carry back from it the blood of

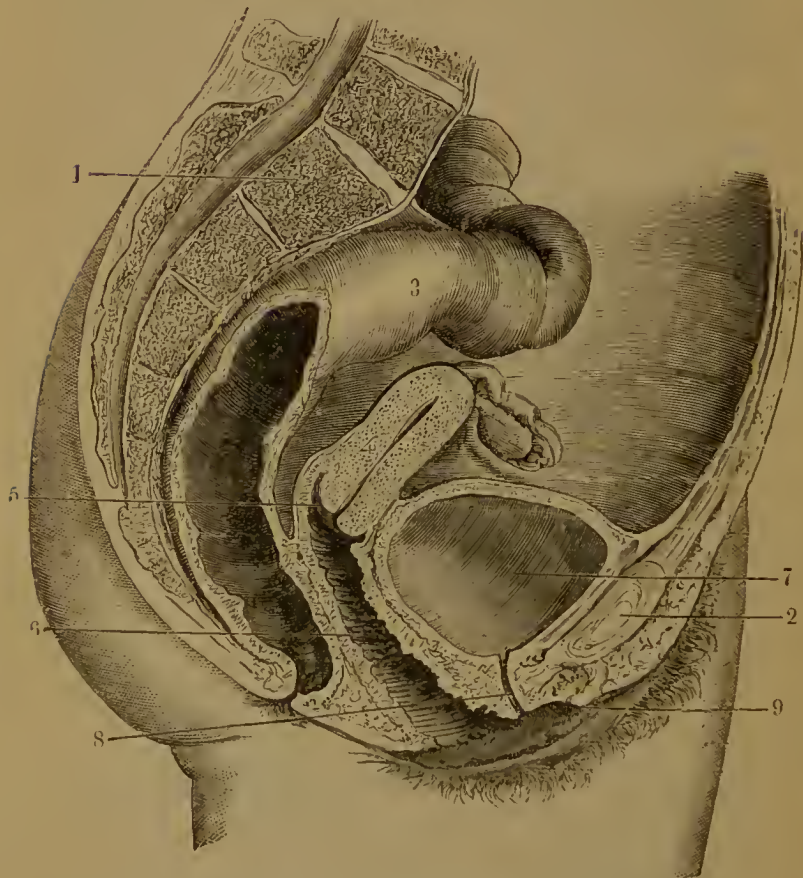


Fig. 3.—Showing the Canals perforating the Pelvic Floor.

1. Sacrum ; 2, pubes ; 3, rectum ; 4, uterus, unimpregnated ; 5, neck of uterus ; 6, vagina ; 7, bladder (full) ; 8, urethra ; 9, clitoris.

the mother. In the placenta the blood of the child and that of the mother are only separated from one another by a thin membrane formed of

cells, which have the power of transferring the oxygen and the nutriment which the child needs, from the mother's blood to the child's blood. Pure blood passes from the placenta to the child by the umbilical vein, and impure blood passes from the child to the placenta by the umbilical arteries. The *umbilical cord*, or navel string, consists of the umbilical vein and arteries, bound together by a jelly, and covered by the amnion. When the child has begun to breathe, the blood gets oxygen from the air in the lungs, and therefore the placenta is no longer needed.

The pelvic floor.—The abdomen is closed in below by strong muscles and layers of fibrous tissue or fasciæ. These muscles and fasciæ, taken together, are known as the pelvic floor. The uterus is implanted into it. Three canals perforate the pelvic floor: the *urethra* in front, by which urine is discharged, the *rectum* behind, and between them the vagina, which is the passage leading to the womb (Figs. 3 and 4). The *vulva* or private parts form a slit running from before backwards, between two thick folds of skin, or lips, called the *labia majora*, which cover and conceal the orifice of the urethra and that of the vagina. In front of the mouth of the urethra is the *clitoris*: the space between the clitoris and the mouth of the urethra is called the *vestibule*. Running back on each side from the clitoris is a fold of skin, and these folds are called the *labia minora*, or lesser lips. They are also called the *nymphæ*. The vaginal orifice when the labia are separated appears round, and is bordered by a sort of frill of mucous membrane called the *hymen*. The hymen differs much in size and shape in different women, and in those who have had many children is destroyed. The vulva is bounded behind by a thin fold of skin called the *fourchette*. Between the fourchette and the vaginal orifice is a hollow called the *fossa navicularis*.

The part between the fourchette and the anus is the *perineum*.

The vagina.—The vagina, when the woman is in the erect posture, runs upwards and backwards,

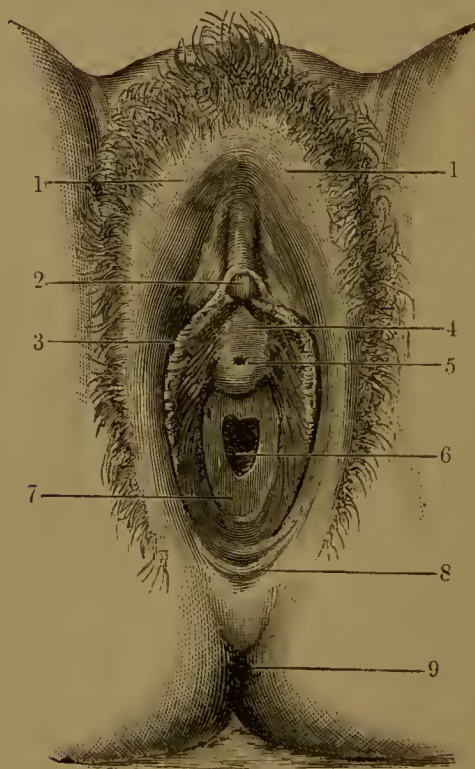


Fig. 4.—The Vulva.

1, Labia majora; 2, clitoris; 3, labia minora; 4, vestibule; 5, meatus urinarius; 6, vaginal orifice; 7, hymen; 8, fourchette; 9, anus.

and although its orifice appears round, yet above the orifice it is a slit running from side to side, bounded by an anterior and a posterior wall, which under ordinary conditions are in close contact. The strong muscular and fibrous structures which form the pelvic

floor are attached to its posterior wall. Below and behind its posterior wall are the rectum, and a mass of tissue reaching about an inch upwards from the

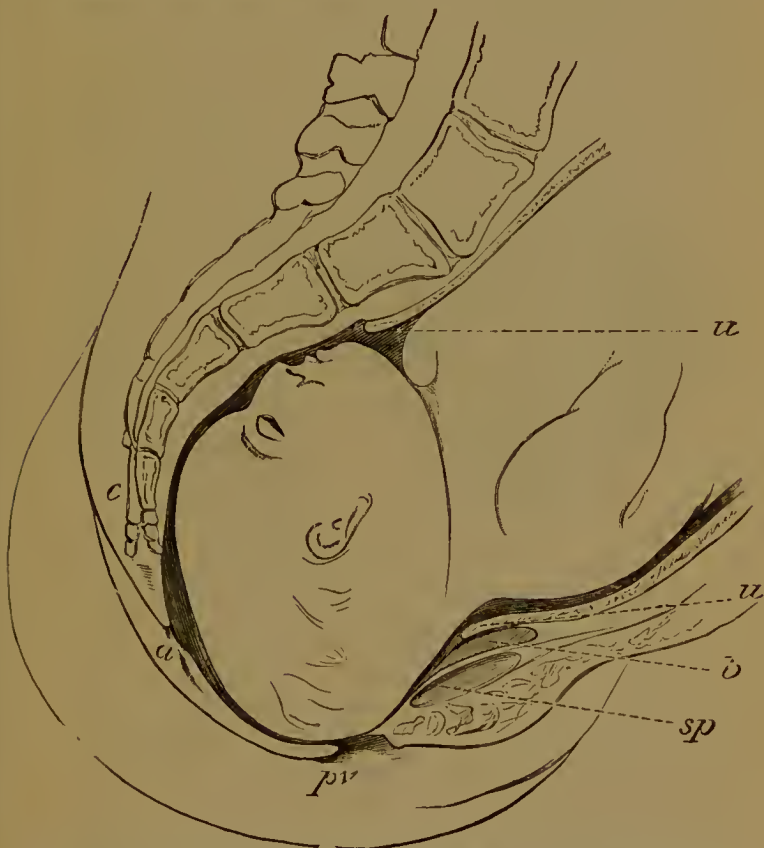


Fig. 5.—Illustrating the Manner in which the Vagina is opened up; the anterior wall pulled up, the posterior pushed down. (From Barnes.)
u, Uterus; *b*, bladder; *sp*, symphysis pubis; *c*, coccyx; *a*, anus; *pv*, perineum.

perineum, and called the perineal body. In front of the anterior wall, and attached closely to it, are the bladder and urethra. During pregnancy the vagina becomes larger, softer, and looser than it was before.

In labour, the vagina is opened up to let the child pass in the following manner. The anterior wall, and with it the bladder and urethra, are pulled up, in front of and over the child's head, while the child's head pushes the posterior wall down and back (Fig. 5).

The resistance which the neck of the womb and the vagina offer to being stretched open to let the child pass is the chief obstacle to delivery ; for when

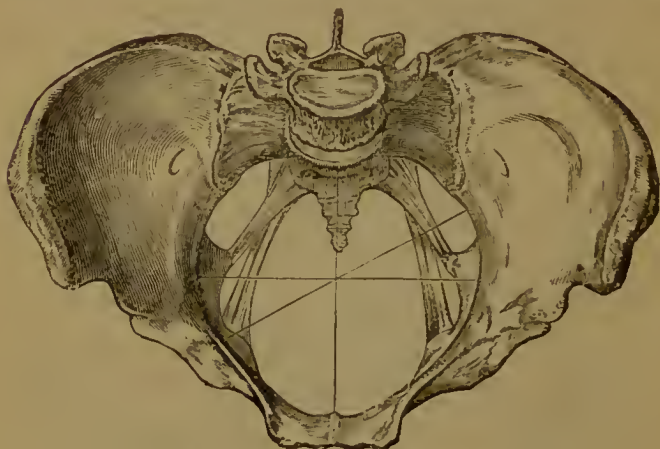


Fig. 6.—Pelvis, seen from above, showing the False Pelvis.

the pelvis is well shaped, and the child not larger than ordinary, and in a suitable position, it will pass easily, with room enough and to spare, through the bony canal.

The pelvis.—(In reading the following pages the pupil should have at hand a female pelvis and a foetal skull. The measurements will be more easily recollected if the learner verifies them with a pair of callipers.)

The pelvis is a bony ring which rests upon the thigh bones and supports the spine. With the muscles and ligaments attached to it, it forms the floor of the abdomen. Hence, in order to be born the child has

to pass through this bony ring, and stretch open the soft parts which form the floor of the pelvis.

The pelvis consists of two parts: the true and the false pelvis. The *false pelvis* is the expanded upper part, and is open in front. The *true pelvis* forms, roughly speaking, a short curved cylinder: and through this the child has to pass (Fig. 6). This cylinder is not the same width at every part; its size varies something like the rifling of a gun, and therefore to get along it the child's head has to make certain turns; and the size and shape of the child's head are such that it can only get through the pelvis in a certain position, and by making certain movements. A knowledge of these turns and movements constitutes what is called the *mechanism of labour*. It is essential that anyone who professes to be more than a monthly nurse should understand this mechanism.



Fig. 7.—Sacrum and Coccyx.

Bones and joints in the pelvis.—The pelvis is formed by three bones: the *sacrum*, which is behind, in the middle, and is the lower end of the backbone. Attached to the tip of the sacrum by a joint is a small bone, a continuation of it, called the *coccyx* (Fig. 7); at the sides, the two *ossa innominata* (Fig. 8). In the child, each *os innominatum* is composed of three bones: the *ilium*, the expanded upper part, which forms the false pelvis; the *ischium*, on



Fig. 8.—Os Innominatum.



Fig. 9.—Os Innominatum as it is in the Child, divided into its three parts—Ilium, Ischium, and Pubes. The space between them is filled up with cartilage.

which we sit; and the *os pubis*, which meets the bone of the other side in front. Bounded by these three bones is a large hole filled up with membrane during life, and called the *obturator foramen* or *foramen ovale* (Fig. 9). The joint by which the two pubic bones are united is called the *symphysis pubis*. The joint between the ilium on each side and the sacrum is called the *sacro-iliac synchondrosis*. In a woman who is not pregnant these joints allow very little movement; but at the end of pregnancy they become looser, so that the bony ring can move a little on the sacrum, in such a way as to make the measurement from before backwards a little larger, either at the brim or outlet, as may be required (Fig. 10).

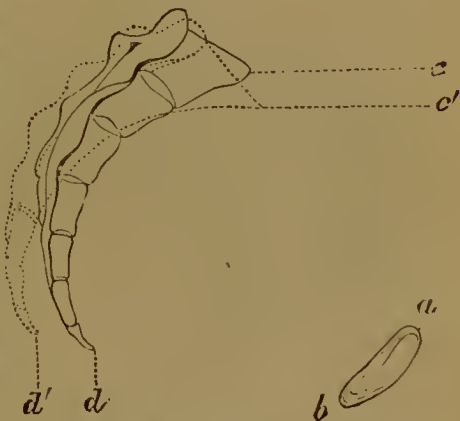


Fig. 10.—Showing the way in which, by Movement of the Pelvis on the Sacrum, the Measurement from before backwards is enlarged.

ab, Symphysis pubis; c, promontory of sacrum; d, coccyx.

By this movement the conjugate diameter can be enlarged by about a twelfth of an inch, and the antero-posterior diameter of the outlet by about one-sixth of an inch. When the patient is standing, the conjugate is at its widest, and the tip of the sacrum at its nearest to the pubes. Hence, during the first stage of labour the standing posture slightly helps the entry of the head. When the patient bends forward, the pelvis so moves on the sacrum that the conjugate becomes shortened, and the antero-posterior diameter of the outlet increased.

Hence the position usual during the second stage slightly helps the passage of the head through the pelvic outlet.* When the patient is put in what is called *Walcher's position*—that is, lying on her back on a high couch or table, with her legs hanging down—the conjugate is enlarged to the utmost that it will allow. The degree of enlargement varies, being in different patients from one-fifth to half an inch. And

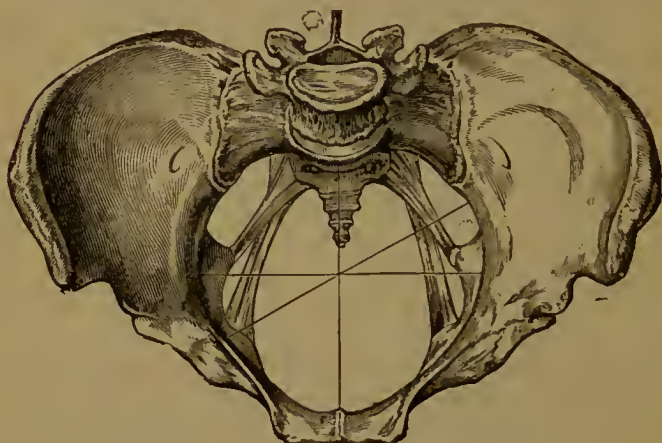


Fig. 11.—Showing Brim of Pelvis and its Diameters.

each os innominatum can also move a little in such a manner as to make the ischial tuberosities a little farther apart.† By this movement the transverse diameter of the outlet may be increased by as much as a third of an inch.

The pelvic canal.—The curved cylinder which the true pelvis forms is shorter in front, which is the inside of the curve, than behind, the outside of the curve. It measures in depth about an inch and a half in front, and about five and a half inches behind.

* See Duncan, "Mechanism of Natural and Morbid Parturition."

† See Driver, *Boston Med. and Surg. Journal*, Sept. 15th, 1887.

The upper opening, by which the head enters the canal is called the *brim* or *inlet* of the pelvis. The line bounding the brim is called the *ilio-pectineal line*, and on it, rather nearer the sacrum than the pubes, is a slight elevation, the *ilio-pectineal eminence*. The lower opening, by which the head leaves the canal, is called the *outlet*. The brim is formed all round by bone; it would be oval in shape were it not that the sacrum projects forward. The projection which the sacrum makes where it joins the spinal column is called the *sacral promontory*.

Pelvic measurements.—The distance from the most prominent part of the sacral promontory to the nearest point of the symphysis pubis is called the *conjugate diameter* (Fig. 11). It is the smallest measurement of the brim of the pelvis; and therefore the one the size of which it is most important to know, for if this diameter is large enough to admit the child's head, the others probably will do so too. This diameter should measure four inches or a little more. The longest diameter of the brim in the skeleton pelvis is that measured from side to side, between the most distant points of the pelvic inlet. It is called the *transverse diameter*, and should measure five inches or a little more. In life, when the bones are clothed with flesh, the *oblique diameter* is the longest. It is measured from one sacro-iliac synchondrosis to over the middle of the opposite obturator foramen, or rather more than a finger's breadth in front of the ilio-pectineal eminence. The oblique diameter should be about four and three-quarter inches. The oblique diameters are called *right* and *left* according to the sacro-iliac synchondrosis from which they start; thus the right oblique diameter is the measurement from the right sacro-iliac synchondrosis to the pelvic brim above the middle of the obturator foramen. The part of the pelvis between the brim and the outlet is called the *cavity* of the

pelvis. There is more room here than either at the brim or the outlet. Owing to the hollowing out of the sacrum (both from above downwards and from side to side), the measurement from before backwards is larger here than at the brim, being about five inches, and the other measurements are about the same. Lower down, the sides of the

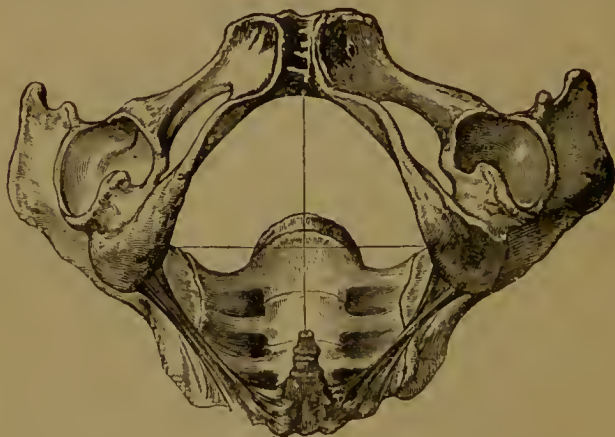


Fig. 12.—Showing Outlet of Pelvis and its Diameters.

pelvis slope so as slightly to approach one another, and hence the transverse diameter at the outlet is smaller than at the brim, being usually about four inches and a quarter. In consequence of the curving forward of the lower part of the sacrum, the diameter from before backwards at the outlet is less than in the pelvic cavity, though greater than at the brim; it is generally about four inches and a half (Fig. 12). This measurement is made from the lower border of the pubic arch to the tip of the sacrum. The distance from the pubic symphysis to the tip of the coccyx is only about three and three-quarter inches; but this is unimportant, because as the child's

head passes it can push the coccyx backwards.* The pelvic outlet is bounded in front by the pubes and the ischium, and the masses of bone which limit it transversely are called the tuberosities of the ischium. Behind there is a deep gap left between the ischium and the sacrum: this is called the sacro-sciatic notch. During life it is bridged over by a strong ligament called the sacro-sciatic ligament. The pelvic outlet is therefore bounded partly by bone, partly by ligament. The sacro-sciatic notch is divided into two parts by a point of bone called the spine of the ischium. If the pelvis be looked down upon from above, it will be seen that this spine projects slightly into the pelvic cavity. Some think that this spine is very useful in guiding the head in its proper course through the pelvis. It really, however, has little if any influence on the way in which the head turns.

The fœtal head.—The head is the largest and hardest part of the child, and where it can pass the rest of the child can follow, unless it be deformed by disease. Hence the head is the part that we have to study to understand the mechanism of labour. Its size and shape must be well examined.

The child's head is egg-shaped, the large end being behind. The skull consists, broadly speaking, of two parts—the base and the vault. The brain rests on the base of the skull, and is covered in by

* There is no fixed standard to which every pelvis conforms. The measurements given above are those which I believe most nearly represent the average of normal pelves. The following measurements, given by Dr. Barbour, are very near the average, and may be easier to remember:—

	Conjugate.	Oblique.	Transverse.
Brim - - - - -	4	4½	5
Cavity - - - - -	4½	4½	4½
Outlet - - - - -	5	(4½)	4

the vault of the skull. The base of the skull is hard and firm. The vault of the skull is thin; the bones which form it are not completely ossified at birth, so that there are spaces between them where bone does not exist, and they can ride over one another, and

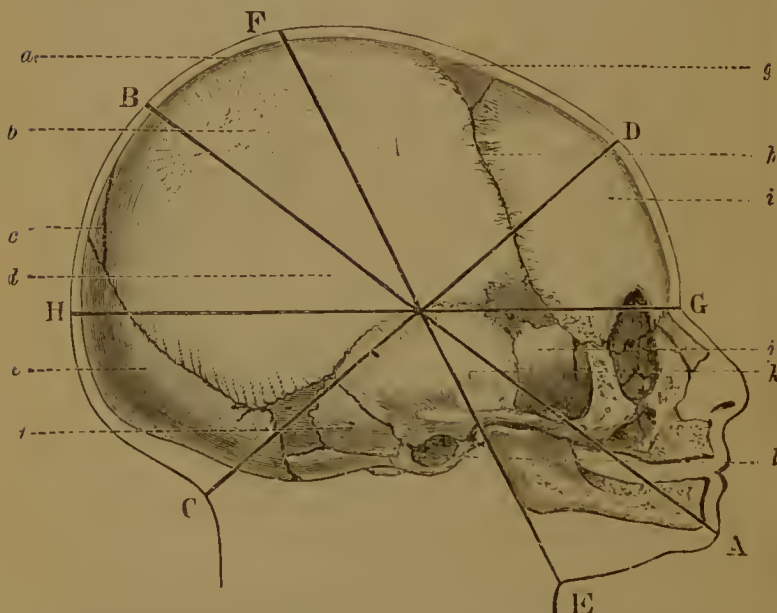


Fig. 13.—Bones and Measurements of Foetal Skull.

a, Sagittal suture; *b*, parietal eminence; *c*, posterior fontanelle; *d*, parietal bone; *e*, occipital bone; *f*, temporal bone, mastoid portion; *g*, anterior fontanelle; *h*, coronal suture; *i*, frontal bone; *j*, sphenoid bone; *k*, temporal bone, squamous portion; *l*, temporal bone, petrous portion. For explanation of capital letters see Fig. 14.

can bend, thus lessening the size of the head. The most vital part of the brain, that from which the nerves which control breathing proceed, is called the *medulla oblongata*; it is a continuation of the spinal cord, and rests directly on the base of the skull. Nerves run out from the brain through holes in the base of the skull. Any injury to the *medulla oblongata* is necessarily fatal; the base of the skull

is hard and firm, in order to protect it. The part of the brain above, which is called the cerebrum, and which fills the vault of the skull, may be injured without killing the child, and may be compressed a good deal without harm. Hence it is not essential that the vault of the skull should be so strong as the base.

The vault of the skull is mainly composed in the adult of four bones, in the child of five (Fig. 13). In front is the *frontal* bone, which in the child consists of two pieces, one on each side. Behind is the *occipital* bone. Between the frontal and the occipital bone are the two *parietal* bones, meeting in the middle. The lines between these bones are called *sutures*. That between the two pieces of the frontal bone is called the *frontal* suture. Its continuation backwards in the middle line of the head, between the two parietal bones, is called the *sagittal* suture. The line between the frontal bone and the two parietal bones is called the *coronal* suture. At the place where the two parietal bones and the two halves of the frontal bone meet there is a four-sided gap in which no bone is to be felt; this is called the *anterior fontanelle*. During labour the bones are sometimes so pressed together that hardly any gap is to be felt; it becomes little more than a point at which four sutures meet. The line between the parietal bones and the occipital bone is called the *lambdoidal* suture. At the place where the two parietal bones and the occipital bone meet is a three-sided gap filled only by membrane, and called the *posterior fontanelle*. During labour, from the compression of the head, this is only to be felt as a point at which three sutures meet. These sutures and fontanelles are very important, because by feeling them we can make out the position of the head during labour. The base of the skull is formed in front by a small part of the frontal bone, called its *orbital*

plates. The occipital bone in the child consists of two parts—the *basilar* and the *squamous*—which are united in the adult. The squamous portion forms the back part of the vault of the skull. The basilar portion forms the hinder part of the base of the skull. It contains a large hole called the *foramen magnum*,

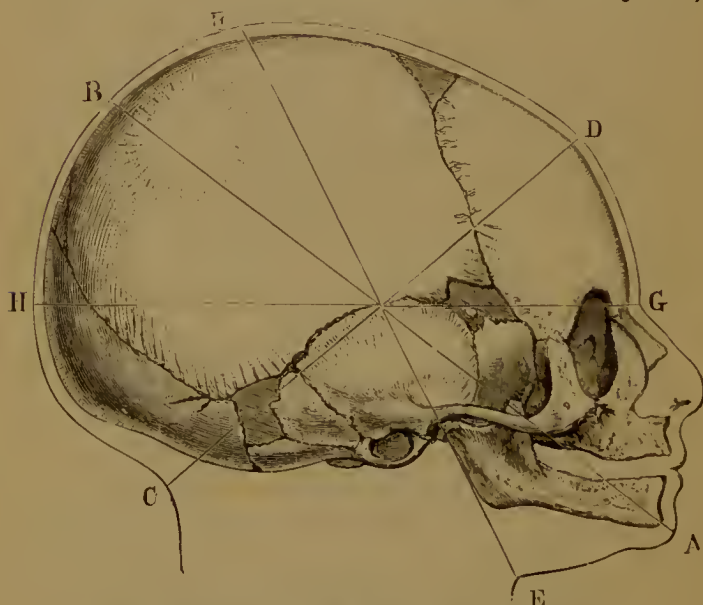


Fig. 14.—Showing Measurements of the Fœtal Skull.

A B, Vertico-mental; C D, sub-occipito-frontal; E F, cervico-vertical;
G H, occipito-frontal.

through which the medulla oblongata joins the spinal cord; and on each side of this, underneath, are two smooth surfaces called the *occipital condyles*, by which the skull is jointed to the spine. Between the frontal bone and the basilar part of the occipital bone is the *sphenoid* bone; in the middle and on each side of it are the *temporal* bones. Each temporal bone consists of three parts. Inside is the *petrous* portion, which is very hard and strong, and with the sphenoid makes

the strongest part of the base of the skull. Above is the *squamous* portion, which joins the parietal bones, and forms a small part of the vault of the skull. Below and behind the squamous portion, and outside and behind the petrous portion, is the *mastoid* portion. This is the point of bone that can be felt just behind the ear. In front of and below the temporal and sphenoid bones are the jaw bones.

The bones of the vault of the skull are thickest in the middle, and get thinner towards the edges. These thick prominent parts are called the *frontal eminences*, the *parietal eminences*, and the *occipital protuberance*, respectively. It is well that the bones are thickest at these places, because these are the parts on which, when children fall, they are likely to strike themselves.

Measurements of fœtal head.—The longest measurement of the head is from the chin to the most distant part of the sagittal suture. This is called the *vertico-mental* diameter, and measures about five inches and a quarter (Fig. 14). Now, as the largest measurement of the pelvic cavity is about five inches, it will be clear that the child's head could not possibly pass if it were so placed that the vertico-mental diameter had to enter the pelvis. The measurement taken from the lower part of the forehead, at the root of the nose, to the most distant point of the occiput, is called the *occipito-frontal* diameter, and measures about four inches and a half. If the child's head be in such a position that this diameter has to pass through the pelvis (and this sometimes happens) although it can be driven through, this can only be done with difficulty, and if the child be larger than usual it will not be able to pass, nor will it if the pelvis be smaller than usual. The measurement from the back of the neck where it joins the head to the most distant part of the frontal suture, is called the *sub-occipito-frontal*,

and amounts to about four inches.* It can be made less by squeezing. This is the largest diameter that has to pass through the pelvis when the head enters the pelvis in a favourable position, that is, in natural labour. These diameters are all taken from before backwards. The largest measurement across the head from one side to the other is that between the parietal

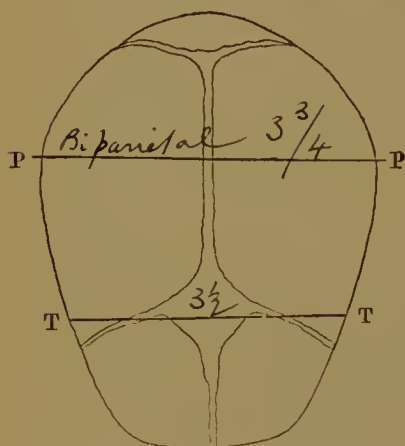


Fig. 15.—Showing Measurements of the Foetal Skull.

PP, Bi-parietal; TT, bi-temporal.

eminences (Fig. 15): it is called the *bi-parietal* measurement, and measures three and three-quarter inches. It is situated rather behind the middle of the head. The *bi-temporal*, or measurement between the two most distant points of the coronal suture, is about three inches and a half. This is the part which, if the head lies across the pelvis, the face looking towards one side, the occiput to the other, has to pass through the conjugate diameter of the pelvic brim. The transverse measurement of the *base of the skull* may be taken either between the two zygomatic processes (that is, the lines of bone running forward horizontally in front of the ears) or between the two mastoid processes. These are called the

* The sub-occipito-bregmatic and the cervico-bregmatic measurements are given in most text-books. But these are unimportant, the really important ones being the sub-occipito-frontal and cervico-vertical, as given above.

bi-zygomatic and *bi-mastoid* diameters. The *bi-mastoid* is a little the larger, and I think more easily measured. It is a trifle over three inches. This measurement is important, because it is the one which cannot be compressed or shortened, for two reasons—(1) because the bone between these points is hard; (2) because the medulla oblongata rests on it, and if this is injured the child dies. The measurement which in natural labour passes through the conjugate is that from a point about an inch in front of one parietal eminence to about half-an-inch behind the other. This diameter is only a trifle larger than the *bi-parietal*, and can be much diminished by squeezing. The average circumference of the head in the plane of the sub-occipito-frontal diameter is between twelve and thirteen inches. The measurement from the point where the head joins the neck in front to the most distant point of the vault of the skull, which is near the anterior fontanelle, is called the *cervico-vertical*. It measures about four and a half inches, but can be altered by compression. When the head is delivered naturally with the face presenting, this is the largest diameter that has to pass through the pelvis. The measurement from a little above one parietal eminence to a little below the opposite one is called the *sub-parietal*, *super-parietal* measurement, and is rather less than the *bi-parietal* measurement. Hence if the pelvic inlet be contracted, the head will pass more easily if it be tilted so that the two parietal eminences do not pass on the same level. In the most common kind of pelvic contraction this is the way in which the head does pass; one parietal bone (usually the one which is in front) sinks down a good deal lower than the other.

The head of the male fœtus is bigger than that of the female by about $\frac{1}{2}$ inch. Sir J. Y. Simpson, in an

elaborate statistical memoir, showed that the following consequences result from the greater size of the male head :—(1) Of the mothers who die from childbirth or its immediate consequences, more have given birth to male than to female children. (2) Of still-born children, more are male than female. (3) Of children born living, more males than females suffer from the injuries and morbid states that result from birth. (4) More males than females die in early infancy, and the disproportion diminishes from birth till about the end of the first year of life. (5) More dangers occur, both to mother and infant, in first than in subsequent labours. (6) Labour is longer with male than with female infants. (7) Of children which die *in utero* before labour, as many are females as males. (8) Of the accidents which happen *after* the birth of the child, as many occur after labours with female as after those with male children. So that there is no doubt that labour is more hazardous with male children, both to mother and child. Male births exceed female in number by about 5 per cent. The extra danger in delivery is one of the influences by which the inequality is corrected.

There is reason to think that with the advance of civilisation the head has increased in size. The heads of civilised races are larger than those of savage races. Increase in size of the foetal head is probably one of the causes of the greater difficulty and danger of parturition in the civilised as compared with the uncivilised female.

maternal death rate greater with males.
 children's " "
 still borns ————
 1st year ————
 Labor longer ————

CHAPTER II.

LABOUR.

Labour is the process of expulsion of the child from the womb into the world. It is effected chiefly by the *contractions* of the uterus, which is a hollow muscle; but these are aided by the expulsive or “bearing-down” efforts of the patient. During a contraction the womb gets smaller and harder, and when the contraction is over it becomes a little larger and much softer. The uterus contracts regularly during pregnancy. During labour another quality comes into play, viz. *retraction*, which means that after each contraction the womb does not return quite to the same state as before the contraction, but remains smaller than it was before the contraction began, so that it goes on becoming progressively smaller throughout labour.

Stages of labour.—Labour is divided into three stages.

The *first* is from the beginning of the pains to the full dilatation of the cervix.

The *second* is from the full dilatation of the cervix to the delivery of the child.

The *third* is from the delivery of the child to the expulsion of the placenta and membranes.

At the very beginning of labour the parts become more moist; and the secretion from them is mixed with a little blood. This is called a “*show*,” and is an indication, though not a constant or certain sign, that labour is at hand.

FIRST STAGE.

The **first stage of labour** consists in the opening up of the cervix uteri. At the end of pregnancy this is a canal a little more than an inch long (*see*

Fig. 2, page 3), the upper opening of which is called the internal os, the lower the external os. In women who have had children, owing to the tearing of the cervix which has taken place in previous deliveries, the external os is often large enough to

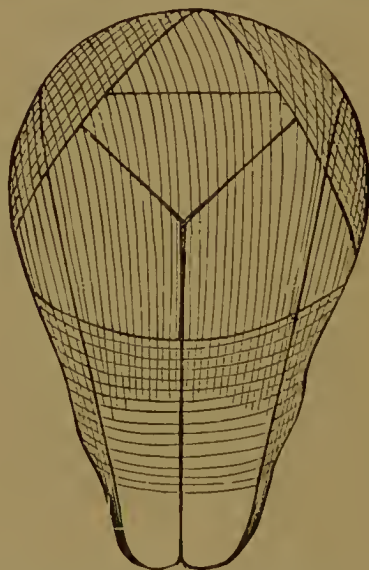


Fig. 16.—Showing the general arrangement of the Uterine Muscular Fibres: Circular Fibres surrounding the Orifices; and Longitudinal Fibres which pull up the Cervix. (After Murphy.)

admit the tip of the finger, but the internal os remains closed till labour begins. It is kept closed by the tonic, that is, persistent, contraction of muscular fibres which surround it like a ring. The beginning of labour is that this muscular ring becomes relaxed. Other muscular fibres which run vertically from the fundus to the cervix of the uterus contract (Fig. 16). When labour has begun their contraction is not, as it was before, opposed by that of the circular ring which surrounds the internal os, and so they pull the os open.

The uterus and cervix thus come to form one cavity, and the bag of membranes comes to lie upon the external os. If this be wide enough, the bag of membranes can be felt with the finger through it. The uterine contractions which do this are not painful,



Fig. 17.—Showing the Bag of Membranes bulging at the Os.

except in conditions of disease. This is the preliminary, or, as it has been called, the “secret” stage of labour.

The contractions continue, and the bag of membranes is pressed upon by the contracting uterus at every point except at the os uteri, and so the bag bulges here (Fig. 17). The pressure of the bulging bag of membranes stretches open the os externum. When the os is small, and only a small portion of the bag of membranes can

enter it, the dilating force exerted is small, and so the os dilates slowly; but the larger it becomes the more of the bag of membranes can be pressed into it, the more force is consequently exerted, and the faster the os is dilated. The first stage of labour is therefore slow at first, but when once begun, goes on with continually increasing speed. This stretching open of the os uteri is painful, and the more it is stretched the greater the pain. Hence the patient feels the uterine contractions which accompany the first stage of labour, and calls them *pains*: and as the first stage advances, they go on getting worse and worse as the cervix is more and more stretched. But the os uteri is not nearly so sensitive as the parts at the orifice of the vagina, and therefore the pains of the first stage of labour are not so severe as those felt while the head is passing out of the vagina. As the bag of membranes advances through the os, the chorion and decidua are detached from the lower part of the uterus.

Bursting of membranes.—When the os uteri is nearly fully dilated, the bag of membranes bursts. It does not always burst at the time it should do. Often it bursts too soon; and sometimes does not burst at all, the child being born in its membranes: but it ought to burst when the os uteri is nearly fully dilated. (It is seldom that the child is born literally in its *membranes*; it is usually in the amnion. The chorion is comparatively soft and weak, and ruptures easily. Then the amnion, if it does not burst, becomes detached from the chorion and advances. If this happens, the chorion is likely to be imperfectly detached from the uterus). Then, in a natural labour, the head comes into the os and stretches it open in the same way as the bag of membranes did. But the head is harder, and its pressure not so gentle, and therefore the pain felt is greater.

Duration.—The average duration of the first

stage of labour is, in first labours, about 20 hours ; in labours not the first, about 12 hours.

Disadvantages of too early rupture of membranes.—The preservation of the bag of waters is essential for a safe and easy first stage of labour. (1) It is a mechanical law that *fluid presses equally in all* directions, and this applies to the bag of waters. The fluid in it presses equally on every part of the uterus and of the child, and therefore no part is pressed upon unduly. When the bag of waters is absent, from the membranes having ruptured too soon, or when there is too little liquor amnii, the labour is slow, because the child does not bulge into and stretch open the os like the bag of membranes. The os is then opened up only by the muscular fibres which pull it open from above, and it cannot be stretched open by the presenting part of the child until it has become open enough for some part of the child to enter it. Now as this stretching, first by the bag of membranes, then by the presenting part, is the chief agent in opening up the os, it is clear that when this bag is absent the first stage of labour must be slow, and so it is. (2) When the liquor amnii escapes too soon, or there is not enough of it, the projecting parts of the child, with each contraction of the uterus, are pressed time after time against the same spots of the uterine wall, and the pressure being concentrated on these points is much greater than it ought to be. Hence if the liquor amnii be absent, the first stage of labour is not only too long, but it is more painful ; and if other causes combine to delay delivery the continued pressure on certain spots in the uterine wall may lead to inflammation, or rupture, or perforation at these spots, thus putting the woman in great danger. And not only does the too early escape of the waters lead to slow dilatation and injurious pressure on the uterus, but (3) it is bad for the

child. While the child floats in the bag of waters, the liquor amnii presses on every part of the child and of the cord, equally and gently. But if there be no liquor amnii the cord may be so compressed between the child and the contracting uterus as to stop the circulation through it and so kill the child. Further, (4) while the child is floating freely in the liquor amnii, those conditions which have the effect of putting it in the best position for being born (elsewhere described) can act easily, while they cannot act if the child is embraced by the contracting uterus. Therefore if the child be in an unfavourable position at the time the membranes rupture, there it will probably stay. And if the dilatation of the os has to be performed by the head, the pressure upon the head is greater and more prolonged than in a natural labour, and this may have injurious consequences; and if by the breech, the pressure on the cord will be so great and continuous that the child is almost certain to be still-born.

Too early escape of the waters is thus in many ways a great misfortune, leading always to a longer and more painful labour than the patient otherwise would have had, often to danger to the child, and sometimes to danger to the mother.

The mechanical effects of uterine contractions.—The contractions of the uterus have different mechanical effects under the different conditions present at different periods of labour.

The general intra-uterine pressure.—When there is so much liquor amnii that the child can move about without being in contact with the uterus, and the uterus contracts, the amniotic fluid reacts and presses *equally in all directions*. This equal pressure in all directions is known as the “general intra-uterine pressure.” At the os uteri this pressure is only opposed by the membranes, and

therefore they bulge. The equal pressure on every other part of the uterus tends to make the uterine cavity spherical, because the sphere is the figure which contains the largest contents in proportion to its superficies. A horizontal section of the uterus when relaxed is kidney-shaped, there being an indentation behind produced by the spinal column. When the general intra-uterine pressure comes into play, it undoes this kidney shape, makes the section of the uterus round, and so lifts it forward.

This general intra-uterine pressure is seldom in action alone during labour, because there is seldom enough liquor amnii to permit its uncomplicated action: the child is generally in contact with some part of the uterus. But the general intra-uterine pressure is always present when there is liquor amnii, though the child may prevent it from having its full effect.

The fœtal axis pressure.—In most labours, and in all labours after the escape of the liquor amnii, the breech of the child (when the head presents) is in contact with the fundus uteri. When the uterus contracts, it presses on the breech, and this pressure is transmitted along the spinal column to the head, which is thus pressed down. This pressure, being exerted along the long axis of the child, is called the “fœtal axis pressure.” When the child is dead, this pressure is not so well transmitted to the head; and this is one reason why labours with dead children are often slow.

The form restitution pressure.—The difference between an empty uterus and one with a fœtus and liquor amnii inside it is not simply one of size, but one of shape. The cavity of the empty uterus is not round or egg-shaped; it is flattened from before backwards, and much longer than it is broad. When the uterus contracts, it strives to assume its own

proper shape ; that is, its shape when empty. It cannot do this without straightening out the foetus, obliterating the curve of the foetal spine, and thus increasing the distance between the breech and the head. As the breech is held down by the pressure of the uterus upon it, this straightening out forces down the foetal head. It is this force which drives the head through the pelvis, for when the head is passing over the perineum the breech is no lower down than it was at the beginning of labour. It is this effort of the uterus to assume its own proper shape that sometimes spontaneously corrects malpresentations.

SECOND STAGE.

The **second stage** of labour is from the full dilatation of the os uteri to the birth of the child. The os uteri is now pulled up over the child's head. With it, the bladder and anterior vaginal wall are pulled up out of the way of the child (Fig. 18). The presenting part of the child, driven on by the action of the uterus and the bearing-down efforts of the patient, forces down the posterior wall of the vagina and the parts behind it, and stretches them open. The perineum is stretched both from side to side and from before backwards. The anus is pressed down and pulled forwards. If the patient suffer from piles, these are made to protrude. If the rectum has not been emptied, and there are faeces in it, the head, as it descends, squeezes them out.

In a natural labour, with a full-sized and well-shaped pelvis, and a child of not more than average dimensions, the sole work of the second stage of labour is to stretch open the vagina and vulva : there is no difficulty at all arising from the bony parts. Hence the child's head is not at all fixed in the pelvis. It moves on when the uterus contracts, and when the contraction is over the elasticity of the soft parts

pushes it up again. This alternate advance and recession of the head is a most important sign. So long as it is going on there is no danger whatever of

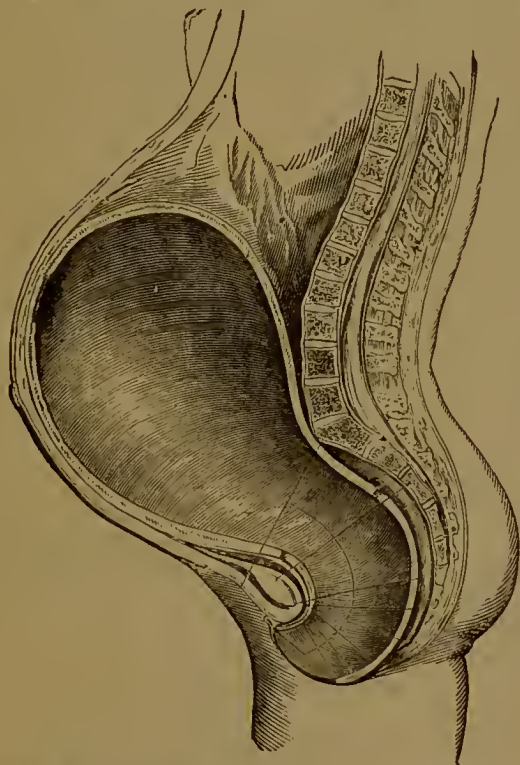


Fig. 18.—Showing the Genital Canal after full Dilatation of the Cervix.

the mother's parts suffering from pressure: nor is there danger, if complications be absent, from prolongation of the labour. If on the contrary the head is *impacted*, that is, wedged fast in the pelvis so that it neither advances nor recedes, nor can be pushed up, then there is danger, and speedy help is needed.

Just as the perineum is stretched to almost its fullest extent it is not uncommon for the head to

remain stationary for a few seconds. This has been called the "crowning" of the head (Fig. 19). It is a good thing, because if it happens the perineum is stretched slowly and is less likely to tear. In first labours the perineum is very often a little torn. The larger the child, and the more quickly the stretching of the perineum takes place, the greater is the risk of

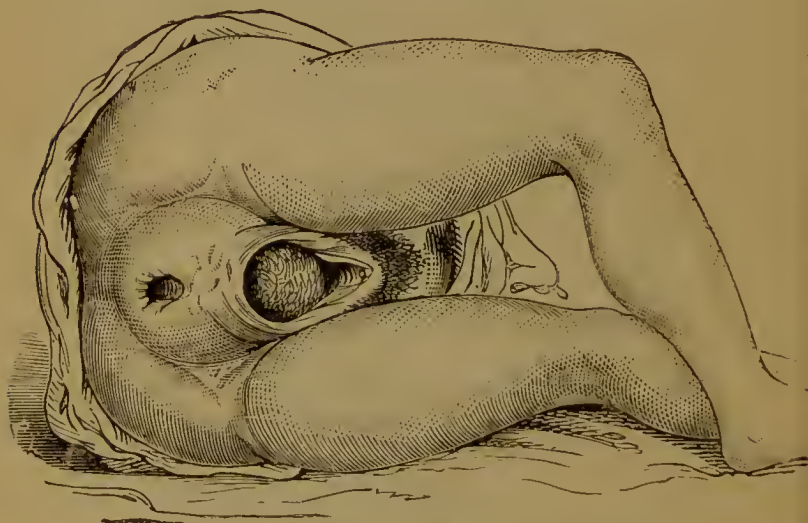


Fig. 19.—The "Crowning" of the Head. (From Galabin.)

tearing. When the head is born, if the shoulders are delivered too quickly the perineum may be torn by them.

With the birth of the child the second stage is ended. During the first and second stages of labour the mother's pulse is about 100 per minute. After the birth of the child it should sink to about 70.

Duration.—The average duration of the second stage of labour is, in first labours, about two hours; in labours not the first, about one hour.

THIRD STAGE.

The **third stage** of labour is *the expulsion of the placenta and membranes*. This is effected by the contractions of the womb. After expelling the child the womb contracts so that it closely grasps the placenta. The inner surface of the womb, which the membranes cover, is much smaller than it was while the child was in the womb, therefore the membranes, as they do not contract, get wrinkled up, and this wrinkling separates them from the womb. Further uterine contractions separate the placenta from the womb and drive it downwards towards the os uteri. If the placenta and membranes are completely detached the placenta is squeezed out edge-wise, folded with its uterine surface outwards (Fig. 20). But often the lower edge of the placenta is the last part to be separated, and then this part is held back while the upper part is pressed down. If this be the case the placenta will come down so folded that its smooth foetal surface is in advance. But whichever way it comes down, in a natural labour the uterine contractions alone drive the placenta out of the uterus into the vagina, and drive it out so folded and compressed that hardly any blood is contained between the uterus and the placenta. If the delivery of the placenta in the natural manner be interfered with by dragging at the cord, it may be that the part to which the cord is attached is so pulled away from the uterus



Fig. 20. — The Natural Mode of Expulsion of the Placenta.

that blood is sucked from the uterus into the space between the placenta and the uterus (Fig. 21), and then the patient loses more blood than



Fig. 21.—Showing the Effect of pulling on the Cord.

she ought to do; and the clotting of blood in the uterine vessels, which is the natural preventive of hæmorrhage, is interfered with, and the danger of bleeding afterwards is increased. To pull at the cord is therefore bad practice. The amount of blood lost in the third stage of labour ought not to be more than a pound. When the placenta is in the vagina it is usual for the attendant to help it out. The vagina has not the power to expel it. It may be driven out by the coughing or bearing-down efforts of the mother, but such effort is seldom sufficient; and if the delivery

of the placenta be not assisted, it may be delayed for hours or even days. The membranes are very often still attached round the lower part of the uterus after the placenta is completely outside the vulva; and therefore it is generally necessary for the attendant to make a point of ascertaining that the membranes are completely delivered.

CHAPTER III.

THE MECHANISM OF LABOUR.

Reasons for the common position of the child.—In three cases out of four the child lies in the womb with its head downwards, and its back forwards and to the left (Fig. 22). The child lies *in utero* with its limbs flexed—arms close to side, elbows bent, fingers bent, arms crossed on the chest, thighs bent on abdomen, knees bent, legs crossed. The reason of this attitude is partly because by it the child's bulk is made as small as possible; if it tended to assume any other position, the pressure of the uterus would restrain it. It is also because the flexor muscles are stronger than the extensor. In many forms of paralysis due to causes which affect alike all the muscles the extensors suffer sooner, more, and longer than the flexors.* Thus the back of the child has a convex outline, the front a



Fig. 22.—Usual Attitude of Child.

* See Ferrier, *Brit. Med. Journal*, 1894, vol. ii., p. 723.

rather concave one. The child's back is in front because the concavity of the front of the child fits the projection of the mother's spine better than the child's back. The child lies with its head down simply on account of its weight. It has been found by experiment that when a healthy, though stillborn, child is put in fluid of the same specific gravity as the liquor amnii it sinks



Fig. 23.—Vertex presenting: First Position. (After Farabeuf.)

in the fluid in exactly the same position that it occupies in the womb. Premature children, children that have been dead for some time, children with water on the brain, and other diseased conditions, when put in such fluid do not take this position, and therefore we find that abnormal positions of the child are common in pregnancy and labour with premature and dead children. The child lies with its back to the left, because the rectum is at the brim of the pelvis on the left side, and pushes the child's forehead over to the right side. Very little force is enough to move the child when it is floating in the liquor amnii.

The first position.—The child ought to be born not only with the head first, but with the top of the head or vertex in advance. This is the part which ought to enter the bony canal first, and which does so in nineteen cases out of twenty. There are four different ways in which the child may lie with the vertex presenting, and they are called the four vertex positions, and are numbered. The most common one—that in which three-fourths of children are born—is called *the first position* (Fig. 23). In it the back of the head lies to the left and in front, the forehead to the right and behind. As this is the usual way in which children are born, the mechanism of labour with the child in this position will now be described.

Movements of the head.—It is usual to divide the movements into five, which are the following :—(1) Obliquity ; * (2) flexion ; (3) rotation ; (4) extension ; (5) restitution and external rotation.

But remember that these are not stages distinct from one another ; that steady descent into the pelvis and advance through it go on along with these movements ; and that these five movements pass into one another, the transition from one to another being so gradual as to be imperceptible.

1. **Obliquity** means that the head as it presents in the brim lies in the oblique diameter of the pelvis. It does this because there is more room in this diameter than in any other : as has been said in the description of the pelvis. In some cases of difficult labour there is another kind of obliquity, which is called the *obliquity of Naegele*. This will be described farther on.

2. **Flexion.**—The head is bent so that the chin

* Some authorities omit "obliquity," as not being, strictly speaking, a "movement." But it is an essential part of the mechanism, and is therefore here enumerated among the movements.

is near the sternum. The head is generally held bent in the womb before labour, and when the head is pressed down during labour the effect of the pressure is to bend it more and more. This is so for two reasons : first, the part of the top of the head that is

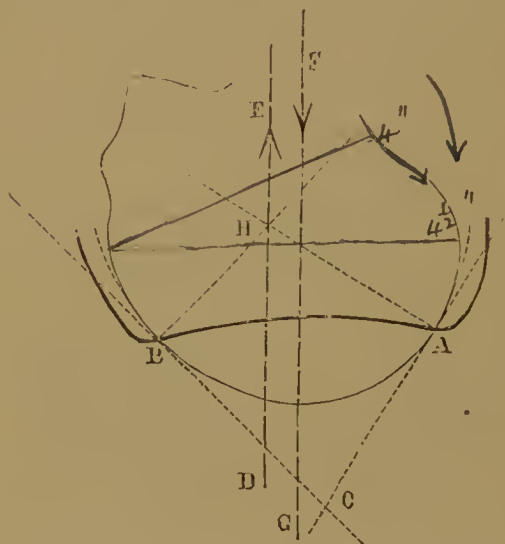


Fig. 24.—Showing how Flexion is promoted by the difference in slope (indicated by the lines BC , AC) of the front and back of the Child's Head. (From Galabin.)

The lines AC , BC , are tangents to the curves of the fetal head which are in contact with the os uteri. The lines AH , BH , perpendiculars to the tangents, indicate the direction of the resistance exerted by the os. They meet at H . Their resultant acts upwards along the line DE drawn through H . The line FG is drawn through the centre of the head, and along it the driving force of the uterus acts. Hence there is at work a "couple" of forces; one along FG pressing the back of the head down; one along DE , pressing front of head up.

forced into the ring of the os uteri by the pains is so shaped that the back slopes more than the front, and thus the back of the head slips down more easily than the front (Fig. 24). Second, the head is jointed to the spine nearer the back than the front (the part in front of the joint being to that behind as 6 to 5), and therefore the resistance to its progress acts more

powerfully on the front than on the back, and so forces the forehead up and bends the head.

Advantage of flexion.—The effect of the bending of the head is that instead of the occipito-frontal diameter, which measures four inches and a half, having to pass through the pelvis, the sub-occipito-frontal, which measures only four inches, and by the pressure on it is made less than that, is the largest diameter that has to pass through the pelvis. The flexion of the head is therefore an important part of the mechanism of labour.

3. Rotation.—It is only at the brim of the pelvis that the oblique diameter is the longest. In the cavity and at the outlet of the pelvis it is not larger than the others. Hence there is nothing in the shape of the bones to keep the head in the oblique diameter when once it has passed the brim.

The great resistance to the birth of the child is from the muscular and fibrous structures which form the floor of the pelvis, and more especially from those which form the posterior part of this floor, because the anterior part of the pelvic floor is pulled up by the contracting uterus out of the way of the child. Now, these muscular and fibrous structures are attached to the back and sides of the pelvis, and the opening is in front and in the middle. Consequently, the part of the head which is in advance meets with the least resistance in front and in the middle, and as soon as it gets down to the floor of the pelvis moves in that direction. At this stage of the labour, therefore, the head turns, so that the occiput, instead of being to the left, comes to be in the middle, and the forehead, instead of being to the right, looks directly backwards. This change is called *rotation*. It often does not take place until just before the head is born (Fig. 25).

4. Extension.—It has been pointed out already that the part of the pelvic floor which the head has to

stretch open in order to be born is behind, and that in front, when the head has got down to the floor of the pelvis, there is hardly any resistance. Hence the

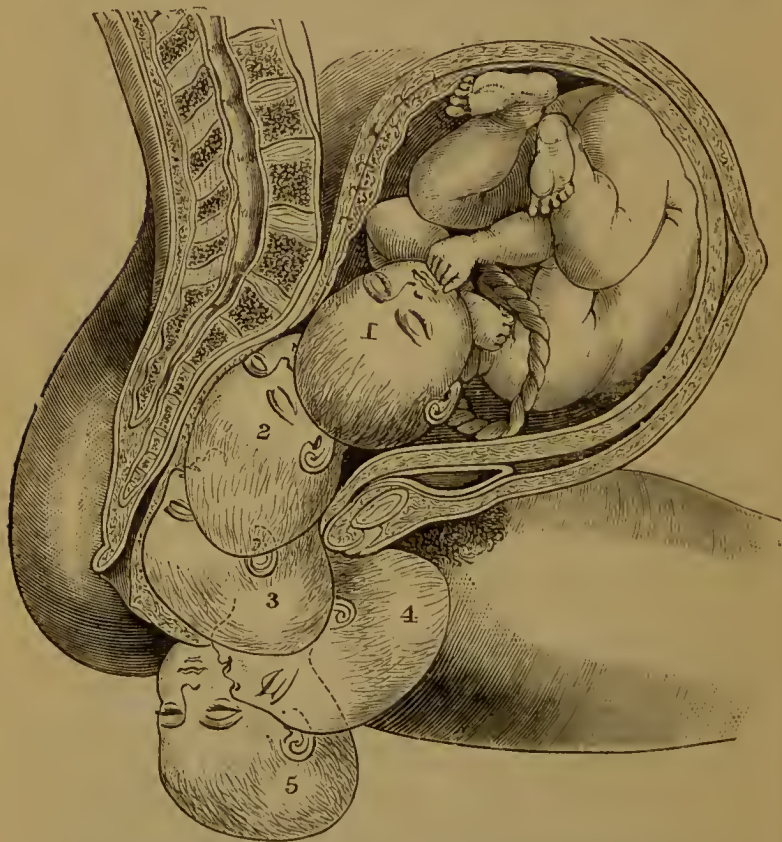


Fig. 25.—Showing the successive Positions occupied by the Head during Delivery in the First Position. (From Galabin.)

advanced part of the head moves forwards. It cannot do this if the head remains bent, as a glance at the diagram will show. Therefore at this stage—that is, when it is emerging into the world—the head ceases

to be bent, the chin leaves the sternum, and the head is extended (Fig. 26).

5. Restitution and external rotation.—

To understand this, the position of the shoulders must be remembered. Their longest measurement is in the opposite direction to the longest measurement of the head. When the head is in the right oblique diameter, the shoulders are in the left oblique diameter. It has been explained that the head is turned from the oblique into the antero-posterior diameter of the pelvis by the resistance of the pelvic floor. When this turn takes place the shoulders are too high up to meet with this resistance; there is nothing to turn them, and they do not turn; the head turns, so that the chin, instead of being opposite the sternum, is towards one shoulder. Directly the head is born, it is liberated from the pressure of the pelvic floor which made it turn towards the shoulder, and is *restored* to its former position: that is, instead of looking straight back towards the mother's sacrum, it looks backwards and to the right. This is *restitution*. But when the head has emerged, the shoulders are able to come down to the floor of the pelvis, and they are turned into the antero-posterior



Fig. 26.—Showing the Extension of the Head in Delivery with the Occiput forwards.

diameter of the pelvis, just as the head was. Therefore the head comes to lie in the opposite direction: that is, transversely, with the face towards the mother's right thigh. This is a continuation of the movement of restitution, and is called *external rotation*, because it is a rotation which takes place outside the pelvis. The face looks the same way after external rotation as it did before internal rotation.

The shoulders are now expelled. If the woman has had children before, and the perineum is very short, the posterior shoulder is first seen, and then the anterior. If the perineum be long, then the posterior shoulder is covered by it until the child has been driven down so far that the anterior shoulder appears at the vulva. When the shoulders have been born the body and legs quickly follow.

Second position.—In about one case in ten the child's head enters the pelvic brim in *the second position* (Fig. 27). In this the long diameter of the head lies in the left oblique diameter of the pelvis. The only difference between it and the first position is, that while in the first position the back of the head is to the left, in the second it is to the right; the forehead to the right in the first position, to the left in the second. The mechanism is exactly the same, except that left and right are reversed. When the occiput meets the resistance of the pelvic floor it turns to the left to get to the middle line, instead of to the right, as in the first position, and the forehead moves towards the right. The shoulders enter the pelvis in the right oblique diameter, instead of in the left. When the head has emerged, the movement of restitution which it makes brings the face towards the mother's left thigh, instead of the right, as in the first position.

These slight differences are of no practical importance. Labour is just as easy and safe when the head is in the second position as when it is in the first.

Occipito-posterior positions.—But there is a great difference between the two positions that have been described and the two that come next to be considered : viz. the third and fourth positions. In these two positions the *occiput lies behind* and the forehead in front. In *the third position* the occiput is to the right and the forehead to the left. The difference between the third and fourth positions is just like that



Fig. 27.—Vertex presenting : Second Position. (After Farabeuf.)

between the first and second positions—merely one of left and right. In the fourth position the occiput is to the left, the forehead to the right. In the third position the long diameter of the head lies in the right oblique diameter of the pelvis, and in the fourth position in the left oblique.

The head presents in the third position in about one case in every ten; in the fourth position not oftener than one case in twenty. Labours in which the head presents with the occiput behind, that is, in the third or fourth

positions, are sometimes, not always, long and difficult. The reason of this difficulty is that the mother's pelvis and the child's head are so shaped that when the occiput is behind there is resistance to its being flexed as it should be. Take the foetal skull and hold it in the pelvic brim in the first position, and you will see that the longest transverse diameter of the head—viz. the bi-parietal—lies exactly in the left oblique diameter of the pelvis, and that there is plenty of room for it. Now turn it round, and hold it still in the right oblique diameter of the pelvis, but with the occiput *behind*, instead of in front (*i.e.* the third position), and you will see that the bi-parietal diameter of the head is not in the left oblique diameter of the pelvis, but behind it, in a part of the pelvis much narrower than the left oblique diameter, and where there is only just room for it—none to spare. Consequently the occiput does not come down so easily in this position as it does in the first position. This is the reason why labours with the head presenting in this position are difficult.

Third position.—Although in this position the descent of the occiput and the bending of the head take place with difficulty, yet they can take place. The first movements, therefore, are just as with the first position—(1) obliquity ; (2) flexion. If flexion takes place properly the occiput comes down, and is the first part which meets the resistance of the floor of the pelvis. It accordingly is turned forwards. It takes the shortest way to the front (Fig. 28). Being directed to the right, it moves along the right wall of the pelvis till it has got into the second position, and then it gets under the pubic arch, just as a head does which presents in the second position. Then all the rest of the labour goes on just as if the head had been from the beginning in the second position. It is necessary, therefore, for the easy progress of labour with

the third position that it should be changed into the second.

There are thus two reasons for delay when the head enters in the third position: first, that flexion is hindered; second, that the head has to get into the second position. For these reasons delivery takes

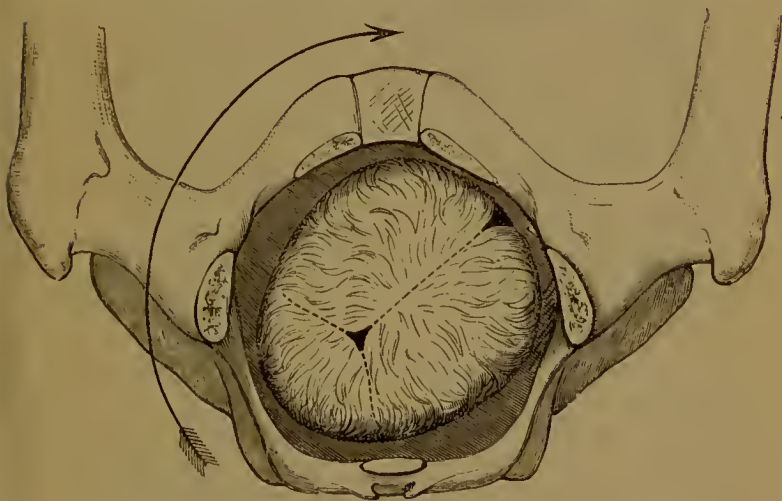


Fig. 28.—Vertex presenting: Third Position.* (*After Farabeuf.*)

longer when the head is in the third position than when it is in the first.

Division of occipito-posterior cases.—But in some cases in which the head presents with the occiput behind, the occiput meets with so much hindrance to its descent that flexion is incomplete. Cases with the occiput behind have been divided into two classes, according to whether flexion is complete or not. If flexion is complete, then the anterior

* The longest transverse diameter of the head in this figure and in Fig. 31, seems to be nearer the front than the back of the head because the head is represented flexed.

fontanelle is high up, near the acetabulum, and these cases are called *bregmato-cotyloid*. If flexion be incomplete, then the anterior fontanelle is lower down, and the frontal eminence is in contact with the back of the acetabulum; and these cases are called *fronto-cotyloid*.

Delivery with occiput behind.—When the head enters the pelvis with the occiput behind, and flexion is incomplete, the first effect is that the occipito-frontal diameter, which is four inches and a half, lies across the pelvis, instead of the sub-occipito-frontal, which is only four inches. There is therefore much less room; the head fits the pelvis more tightly, and advances slowly. When it gets down into the pelvis, the occiput not being lower down than the sinciput, the resistance of the pelvic floor does not affect the occiput more than the sinciput, and therefore does not turn it forwards. So the head remains with the forehead in front, and as it is driven down the forehead is turned towards the middle line and becomes jammed against the back of the symphysis pubis (Fig. 29). In this position the face cannot possibly emerge under the symphysis, for if you will take the foetal skull, and put it in the pelvis, with the forehead against the back of the symphysis and the occiput in the hollow of the sacrum, you will see that for the face to pass out under the pubes the vertico-mental diameter must for a moment lie across the pelvis. Now, as the vertico-mental diameter usually measures more than five inches, while the pelvis measures five inches, this cannot possibly happen. The uterine force pushes down the child's spine, and this pushes down the occiput, which revolves round the symphysis pubis, having the forehead as its centre of movement, and thus is born (Fig. 30). The occipito-frontal diameter, which is four inches and a half, thus has to pass the antero-posterior diameter, which is four inches and a half, so

that there is no room to spare, and indeed, the head can only pass by yielding a little, being moulded as it is squeezed through. The perineum is also stretched

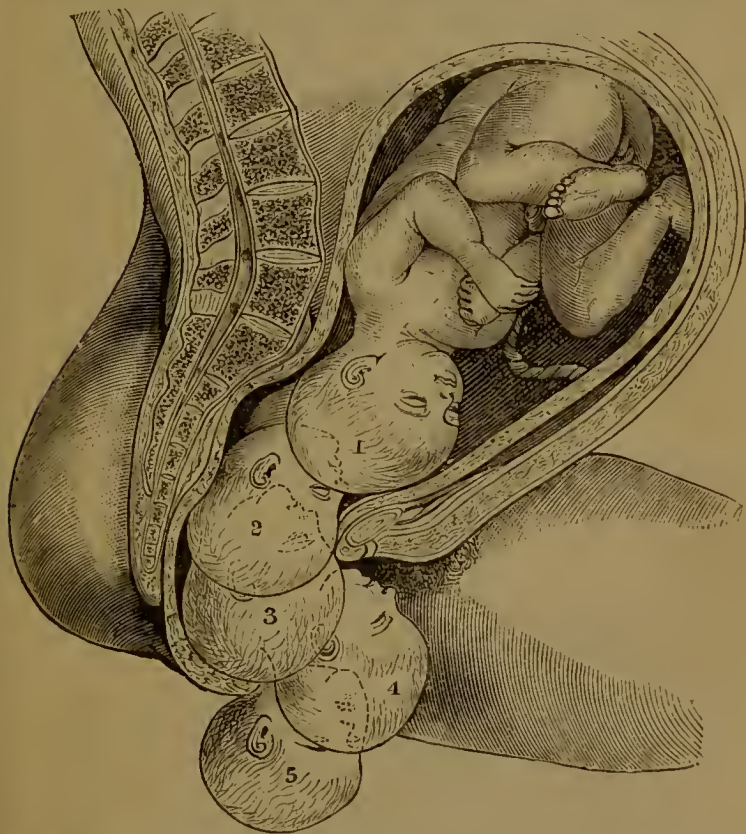


Fig. 29.—Showing successive Positions of the Head in Delivery when the Occiput remains behind. (*From Galabin.*)

more than it should be, when the head passes in this position, for the diameter which should stretch the perineum, the sub-occipito-frontal, only measures four inches, while here it is stretched by the four and a half inches of the occipito-frontal diameter. Hence

the perineum is more likely to be torn when the head is delivered in this position. When the occiput has emerged, then the nape of the neck becomes fixed against the perineum, and the nose, mouth, and chin slip out from behind the symphysis pubis. The shoulders are now in the left oblique diameter of the brim. The head, after it has emerged, makes the



Fig. 30.—Showing Delivery by Flexion when the Occiput is posterior.

movement of restitution to bring itself back into its original position with regard to the shoulders: that is, it turns to the mother's left thigh. Then the shoulders turn into the antero-posterior diameter of the outlet, and emerge as in the second position. Labour in which the head enters the brim with the occiput backwards is thus, if the occiput does not turn forwards, much more difficult and more dangerous.

The **fourth position** (Fig. 31) is that in which the occiput is behind and to the left, the forehead in front and to the right. Just as the mechanism of the second position is the same as that of the first, except

that left and right are reversed, so the modes of delivery, and the mechanism of each, are the same in the fourth position as in the third, except that left and right are reversed. The occiput in the fourth position ought to turn forwards, and so the position of the head become changed into the first position. Sometimes it



Fig. 31.—Fourth Vertex Position. (*After Farabeuf.*)

does not, and then the forehead becomes jammed behind the pubes, and the occiput comes out over the perineum.

Face presentations—their production.—

It has already been mentioned that so long as the membranes are unruptured, and the waters not deficient in quantity, the fluid presses equally on every part of the inner surface of the uterus. But after the membranes are ruptured, the uterus, in contracting, embraces the child more closely, and presses upon its prominent parts. This pressure tends to straighten the child's spine, and so to make the distance between the breech and the advancing head greater, so that,

the breech being pressed upon by the fundus uteri, the head must advance.

The tendency of the pressure of the uterus on

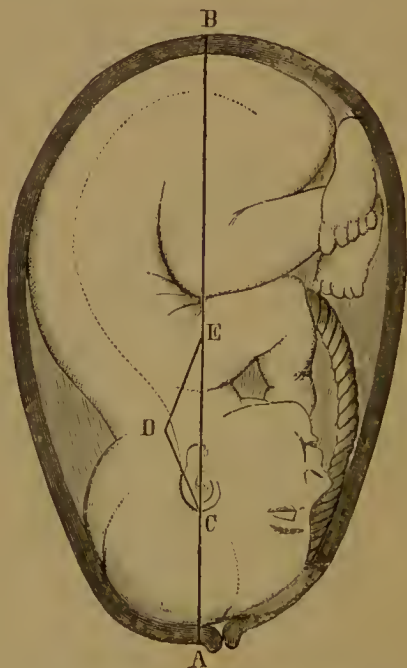


Fig. 32.—Showing how Uterine Contraction increases Flexion.
(After Schatz.)

D indicates the joint between the spine and the head, which is here *behind* the line A B, along which the pressure of the uterus on the head and breech is exerted. Such pressure, therefore, tends to make the angle *EDC* more acute; that is, to increase *flexion*.

the breech, combined with the resistance the head meets to its advance is to press the head and the breech together. Now, if the child is in such an attitude that the joint between the spine and the head lies between the back of the child and the line along which such pressure is exerted, then the effect of the pressure is to increase, as far the uterus will allow, the bending of the back and the flexion of the

head (Fig. 32). But if the child is in such an attitude that the joint between the spine and the head lies on the abdominal side of the line along which the

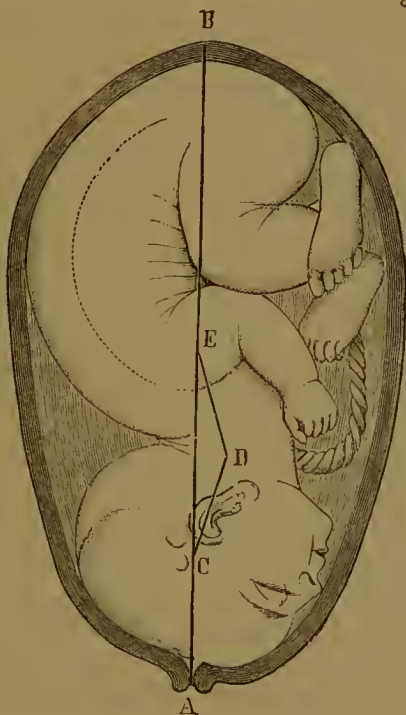


Fig. 33.—Showing how, when Extension of the Head has begun, Uterine Contraction increases it. (After Schatz.)
 D (the joint between the spine and the head) is here in front of the line A B, along which the pressure of the uterus on the head and breech is exerted. Pressure which tends to make the angle E D C more acute, here increases extension.

pressure is exerted (and a very little straightening out of the spine will bring this to pass), then the effect of such pressure is to more and more extend the spine and the head (Fig. 33). Thus, when the head is only a little extended, the effect of the uterine action will be to increase this until the head is as much extended as it possibly can be. When the child is lying in the

womb with its head downwards, the effect of the fullest possible extension of the head is to make the face look downwards and present at the brim; in other words, to produce a *face presentation* (Fig. 34).

There are various **causes of face presentations**, some of which are of

practical importance. One is *obliquity of the uterus*, by which the descent of the occiput is hindered; and if it be ever so little hindered, the action of the uterus may, in the way that has been shown, bring about a face presentation. The importance of this fact is that the obliquity of the uterus may be corrected by making the patient lie on the side opposite to that to which the body of the uterus is deviated; and if this correction be made early, the harm that the excessive obliquity has done will soon be undone. Another important cause of face presentations is *contraction of the pelvis*. Remember that the greatest transverse diameter of the foetal head is the bi-parietal, which is situated behind the middle



Fig. 34.—Attitude in Face Presentation, showing complete Extension of Head. (From Galabin.)

Δ c, line along which expulsive force is transmitted;
M F, Fronto-mental diameter of head.

of the head. Consequently, if the pelvis be so contracted as not to admit easily the bi-parietal diameter, the front. part of the head will come down, and a face presentation will be produced. Recollect this, and if you meet with a face presentation high up, try to make out the size of the pelvis, and if it be contracted, or if you are in doubt whether it be contracted or not, send for assistance early. Face

presentation is also apt to occur when the child is larger than usual, or when the cranium is enlarged by hydrocephalus, for the same reason that makes it common in contracted pelves. Sometimes it is due to some deformity of the child, so that it cannot bend its head. It has been also attributed to excessive length of the child's head, so that the part behind the joint between the head and the spine is longer than the part in front of it. The child's head is always longer than usual when it has been born with the face presenting; but this is from squeezing during labour. There are other causes, but these are all that are practically important. There are causes that prevent the child from properly entering the pelvis, and these may cause the face to present, but they oftener lead to transverse presentation. Among these are: too much liquor amnii, so that the fœtus floats about in the womb, instead of being kept with its head in the pelvic brim; and then, when the membranes rupture, whatever part of the child happens to be nearest the os uteri comes to present. Hence it is important to see that the child is in a proper position before rupturing the membranes. When the child is premature or dead, the relative weight of its different parts is not the same as in a living fœtus at full term, and so the action of gravity no longer helps to make the head present; and if dead, the maintenance in a proper position is no longer helped by the child's movements. Hence, abnormal presentations are common with premature and dead children. There are other causes, which will be mentioned hereafter.

Presentations of the face are divided into four positions. These are numbered as if they were formed out of the four vertex positions. Thus, take the first vertex position, with the forehead behind and to the right, the occiput forward and to the left, and extend the head. The chin will then be behind and

to the right, the forehead forward and to the left. The second face position is with the chin behind, and to the left, the forehead forward, and to the right. In the third and fourth positions the chin is in front; in the third position to the left, the forehead being behind and to the right. In the fourth position the



Fig. 35.—Face presenting : Third Position. (*After Farabeuf.*)

chin is to the right, the forehead behind and to the left.

The ease or difficulty of labour with the face presenting depends upon *whether the chin is in front or behind*. If the chin is in front the labour will not be very difficult. If the chin is behind, the labour may be very difficult. Therefore, in describing the mechanism, the more favourable cases will be first spoken of: viz. the third and fourth positions, in which the chin is forward.

The movements of the head in passing through the pelvis with the face presenting are the same as those when the vertex is presenting, excepting that extension

takes the place of flexion, and later on flexion that of extension. Thus: (1) obliquity; (2) extension; (3) rotation; (4) flexion; (5) restitution.

In the **third position** (Fig. 35) the face lies in the right oblique diameter, the chin forward to the



Fig. 36.—Showing successive Positions occupied by Head in Face Delivery.

left, the forehead behind and to the right. The head is extended as much as it can be, so that the occiput touches the back. The effect of this is to make the chin the most advanced part of the head. As the chin comes down and meets with the resistance of the soft parts forming the pelvic floor, it is turned forwards. By this rotation the face comes to lie in the antero-posterior diameter of the pelvis. Then when the chin has got below the symphysis pubis, it moves

forward underneath it, and the front of the neck is fixed behind the symphysis pubis. Then flexion takes place, and the forehead, vertex, and occiput in succession put the perineum on the stretch and are born (Fig. 36). While this was taking place the shoulders were in the left oblique diameter of the pelvis. Therefore directly the head gets free, the face turns to the



Fig. 37.—Face presenting: Fourth Position. (*After Farabeuf*)

mother's left thigh, which is the movement of restitution. The anterior shoulder then turns under the symphysis pubis, and the birth of the rest of the body is completed as in the second vertex position.

The mechanism of labour in the **fourth face position** (chin forwards and to the right) (Fig. 37) is just the same as that of the third, excepting that right and left are reversed. The chin turns towards the left to get into the antero-posterior diameter of the pelvis. After the head is born the movement of restitution turns it towards the mother's *right* thigh

In the **first and second face positions**, those in which the chin is behind, the mode in which delivery should take place is the following:—

First face position: (Fig. 38) Chin behind and to the right, forehead forward and to the left. The fronto-mental diameter thus, at the beginning of labour, occupies the right oblique diameter of the



Fig. 38.—Face presenting : First Position. (*After Farabeuf.*)

pelvis. The first movements, obliquity and extension, are thus the same as in the positions in which the chin is in front. When the head has advanced so far that the chin meets with the resistance of the floor of the pelvis (and in order that the chin should be the part of the head which first meets with this resistance, it is necessary that the head should be well extended), it is by this resistance (which, it will be remembered, is greatest behind and least in front) turned round through three-eighths of the pelvic ring till the chin comes under the symphysis pubis. Then delivery takes place just

as in the fourth face position. The mode of delivery in the **second face position** (Fig. 39) is the same as that in the first, except that right and left are reversed.

The long rotation of the head which must take place if delivery is to be easy, when the chin is behind, is like that which has to take place when the occiput is



Fig. 39.—Face presenting ; Second Position. (*After Farabeuf.*)

behind. Just as the third vertex position has to be changed into the second, and the fourth vertex position into the first, before delivery of a good-sized child can take place, so the first face position must be changed into the fourth, and the second face position into the third.

When the face is delivered with the chin forwards (by a movement of flexion round the symphysis pubis as a centre, the front of the neck being closely pressed against the symphysis), the largest diameter of the head that has to stretch the perineum is one measured from the front of the neck, where it joins the head, to

the most distant point of the sagittal suture (Fig. 40). This is the cervico-vertical diameter. It measures about four inches and a half, or a little less, and can be reduced by squeezing. This is rather more than the sub-occipito-frontal, which is the largest diameter that stretches the perineum when the vertex presents with

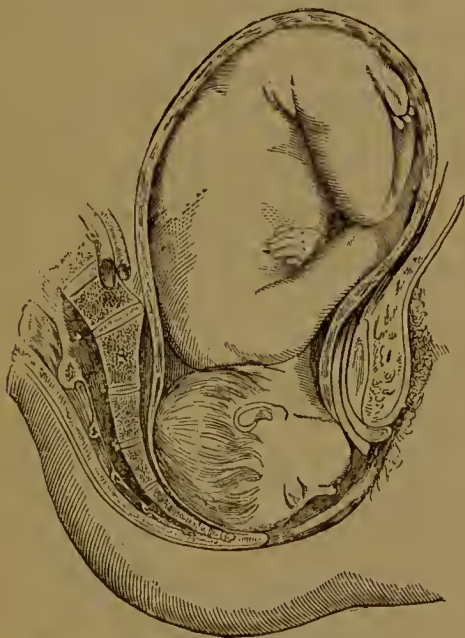


Fig. 40.—Showing Head at Outlet of Pelvis in Face Delivery.

the occiput forwards. (*See Fig. 26.*) Therefore labours with face presentations, even when the chin is in front, are a little longer than labours with the vertex presenting in the first or second position. But besides this, face presentation is often caused by other conditions which make labour long or difficult; and therefore, taking all cases together, labours with face presentations are longer than labours with vertex presentations.

In face presentations with the chin behind, labour

is longer than in the cases in which the chin is in front, because time is occupied in producing the long rotation which ought to take place.

Difficult face presentations.—But in some cases this long rotation does not take place, and the head is driven down to the floor of the pelvis, with the chin behind. If you take the head, and hold it so that the face lies in the pelvic outlet with the chin behind, you will see that the occipital condyles, by which the head is jointed to the spine, are so low down that when the head is in that position the neck and upper part of the chest must also be in the pelvis, and that the head cannot pass through the pelvis unless there is room both for the sub-occipito-bregmatic diameter of the head, which is about three and a half inches, and for the neck, which is about one inch and a half thick. These measurements, together amounting to about five inches, refer to a child of average size. Now, as the antero-posterior diameter of the outlet is only four inches and a half, it is clear that a child of average size cannot possibly pass through the pelvis in this position. It can only do so if the child be small or the pelvis unusually large. Except, therefore, in the case of very small children, delivery with the face presenting and the chin behind is impossible.

Brow presentations.—Sometimes the head presents in a position which is intermediate between a face presentation and a vertex presentation. This is called a *brow presentation*, because in it the forehead of the child is the most advanced part. The diameter that is here engaged in the brim is one running from the chin to about midway between the two fontanelles. This diameter is the longest measurement of the head, so that a full-sized child cannot possibly pass through the pelvis in this position. If such cases are left alone they

generally become changed into either face or vertex presentations, and are born in the manner which has been described in speaking of those presentations. Sometimes, though rarely, the head comes down in the brow position, the face turns towards the front, the jaw (not the forehead, as in occipito-posterior presentations) becomes fixed behind the symphysis pubis, and then the forehead, vertex, and occiput successively distend the perineum, and are born. Such labours are very long and difficult, and when the child is born its head is much deformed.

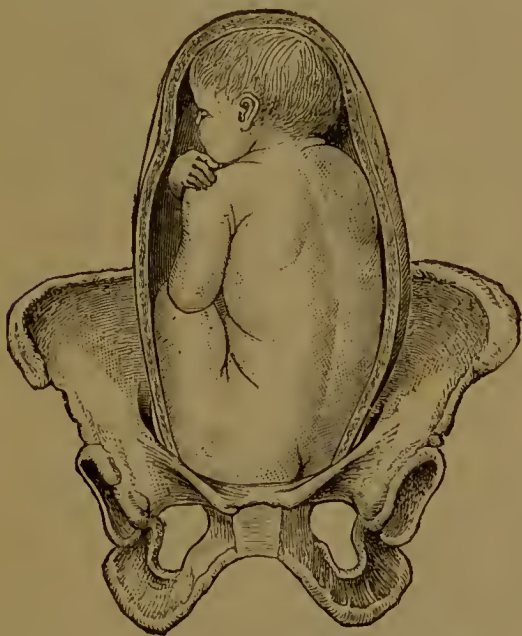


Fig. 41.—Breech : First Position. (*From Galabin.*)

Pelvic presentations.—Those cases in which the child lies with its breech downwards are grouped together as pelvic presentations. They were by some of the earliest writers on midwifery classed

along with head presentations as "natural," because the child will generally be born alive if the foetus enters the pelvis by one end of the egg-shaped mass which it forms as it lies doubled-up in the womb. If the child lies across the pelvis, so that neither end can enter the pelvis, then it is seldom born alive without



Fig. 42.—Breech Presentation with extended Legs.

help, and therefore such labours were distinguished as not natural.

When the child lies with the breech downward, the legs are generally in the same attitude as that which they assume when the head is presenting: that is, the thighs are bent up on the abdomen, and the knees bent, so that the feet are very near the breech (Fig. 41). Sometimes the knees are straightened out, so that the feet are near the head, and this attitude may

make the labour very difficult (Fig. 42). Sometimes (more especially in premature and dead children) one or both thighs, instead of being bent up to the abdomen, hang down, so that a foot or a knee is much lower down than the breech, and is the part first felt by the examining hand. But wherever the feet may be, the mode in which the child passes through the pelvis when the head comes last is the same in all essential points.

Positions of the breech.—The breech may present in one of *four positions*, which are numbered according to the position of the head, so that they correspond to the four vertex positions. Thus the *first breech position* is that in which the back of the child is to the left and forwards; the *second position* that in which it is to the right and forwards. The former position is the commonest, because before the parts of the fœtus are pressed together by being driven down into the pelvis, the measurement from the sacrum to the front of the legs—the sacro-tibial measurement—is the longest measurement of this end of the fœtus; and, therefore, this measurement takes the right oblique diameter, just as, when the head presents, the long diameter of the head goes into the right oblique diameter and for the same reason. But when the breech is driven down into the pelvis, the legs are pressed against the abdomen, and the bis-iliac diameter becomes the longest and, obstetrically, the most important.

First breech position.—The mode of passage in the first position is the following: The long diameter of the breech is that which runs from side to side, between the two trochanters. In the first position this enters the pelvis in the left oblique diameter: the anterior trochanter being to the right, the posterior trochanter being to the left. As the breech descends, the pressure of the soft parts at the

back and sides of the pelvis causes the anterior trochanter, which is the one in advance, to move towards the middle line, and at the same time the child's spine is bent sideways so that the breech can advance forward in a curve like that which the head takes (Fig. 43). This turn of the breech into the antero-posterior

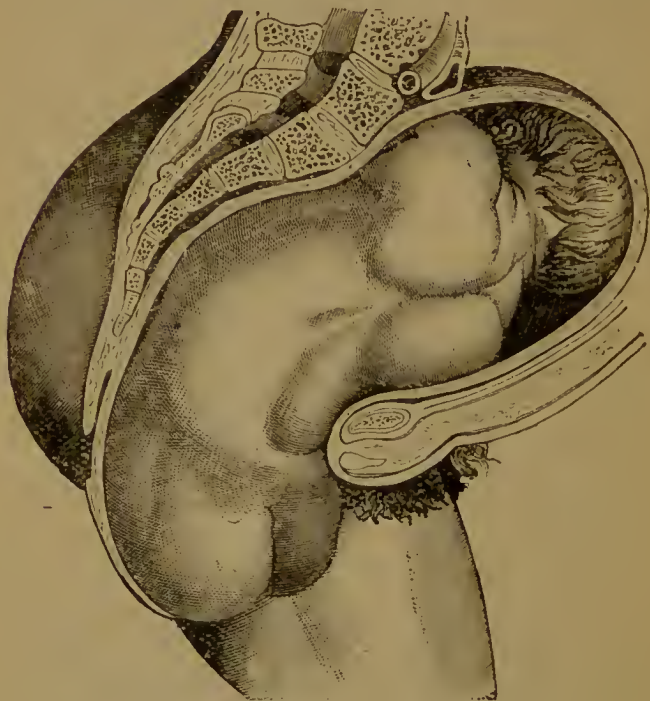


Fig. 43.—Showing Lateral Flexion of Spine in Breech Delivery.

diameter of the pelvis is not often so complete as that which the head makes, because the breech is smaller and softer, and it is not therefore so necessary that it should take exactly the position in the pelvis in which there is most room. Then the anterior buttock appears at the vulval orifice, and stretches the

perineum ; and first it, and then the posterior buttock, pass over the perineum, and are born. When the breech is born, the legs, if they are in the position which they ought to occupy, escape immediately afterwards. Then, if no injudicious traction has been

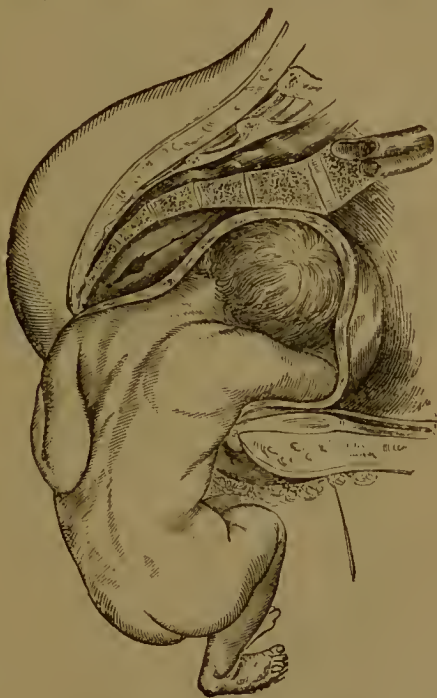


Fig. 44.—Delivery of Shoulders in Breech Labour.

made, the shoulders come down, with the arms crossed over the front of the chest, and the anterior shoulder, which is in this position to the left, turns forwards, so that the long diameter of the shoulders shall be in the antero-posterior diameter of the outlet (Fig. 44) Whether the anterior or posterior shoulder be born first depends partly upon the length of the perineum, partly upon the conduct of the attendant. If there be a long

perineum, the anterior shoulder is usually born first ; but if the perineum be very short—as is sometimes the case owing to rupture in previous labours—or if you draw the body of the child forward, the posterior shoulder may be born first. The turn of the shoulders



Fig. 45.—Mode of Passage of Head in Breech Labour.

into the antero-posterior diameter of the outlet, like that of the buttocks, is not always complete, and for the same reason. When the shoulders are born, they execute, if not prevented, a movement of restitution, and come again to lie in a position corresponding to the left oblique diameter of the pelvis. The head is now in the right oblique diameter, with the occiput forwards and to the left, the forehead backwards and

to the right. The contracting uterus has been, while the body was coming down, pressing on all parts of the head, and as the part in front of the joint between the head and the spine is larger than that behind it, the front part is pressed down—in other words, the head is flexed (Fig. 45). As it comes down, the muscular and fibrous structures forming the floor of the pelvis press the neck forwards and towards the middle line. Therefore, the occiput turns forward, and the face backwards, and the head comes to occupy the antero-posterior diameter instead of the right oblique. Then the nape of the neck is fixed behind the symphysis pubis, while first the chin, then the mouth, nose, and forehead successively pass over the perineum, and are born. The largest diameter which stretches the perineum is therefore the same as that in delivery with vertex presentations: viz. the sub-occipito-frontal.

The **second breech position** is that which corresponds to the second vertex position, the back of the child being forwards and to the right, the abdomen behind and to the left. The long diameter of the buttocks is, therefore, in the right oblique diameter of the pelvis. Delivery takes place in the same manner as in the first position, except that left and right are reversed.

In the **third and fourth breech positions** the back of the child is behind. The *third breech position* is that which corresponds to the third vertex position. The back is behind and to the right, the abdomen forwards and to the left. The long (bis-iliac) diameter of the breech lies in the left oblique diameter of the pelvis. As it descends, the anterior buttock, which lies to the right, moves forward under the pubic arch, and the breech passes the pelvic outlet in, or nearly in, the antero-posterior diameter, and the chest and arms follow. The head, moving with the shoulders,

enters the pelvis in its transverse diameter, occiput to the right, face to the left. Now the pressure of the pelvic floor presses the neck forwards under the pubic arch, and the occiput accordingly moves to the front by the shortest route: that is, it moves round the right side of the pelvis, over a quarter of the pelvic ring, and thus the head comes to lie, first in the left oblique diameter, with the occiput forward, then in the antero-posterior diameter; and is born in the same manner as if the presentation had been at first in the second position.

The mechanism of the *fourth breech position*—that is, with the back behind and to the left, the abdomen forwards and to the right—is exactly the same as that of the third, except that left and right are reversed.

If the child be small, its head may be born, when the abdomen is in front, without making the turn that has been described. If the head is well flexed, the chin, mouth, nose, and forehead may successively pass down behind the symphysis, while the nape of the neck is pressing back the perineum. This cannot happen unless the head is well flexed.

Thus in these two positions the child's head and shoulder make a long rotation such as that which the head makes in the third and fourth vertex positions. At the beginning the long diameter of the head, in the third position, lies parallel with the right oblique diameter of the pelvis. While the shoulders are emerging the head is in the transverse diameter of the pelvis, and when they have been delivered the occiput goes on moving forward until it comes behind the pubic arch.

CHAPTER IV.

ATTENDANCE ON NATURAL LABOUR.

MIDWIFERY practice in most cases may be correctly described as *a branch of preventive medicine*. A skilful accoucheur prevents danger oftener than he has to treat it.

In every case of labour the following things must be attended to :

- (1) Prevention of septic infection..
- (2) *Early diagnosis of what is abnormal.*
- (3) Attention to the comfort of the patient.
- (4) Prevention of accidents.
- (5) Care for the child.
- (6) Prevention of hæmorrhage.

Of these, the second is the only one that requires a well-educated doctor. The others are simple and easy, and a properly trained monthly nurse can do them quite well. The *treatment* of difficult labour is not within the province of the student or midwife.

PRELIMINARY.

When sent for, *go at once*. Never judge by the report of the messenger whether the case can wait or not. Every complication of labour is much easier to treat at the beginning than later on ; and many that are easily put right early in the case, become difficult

and dangerous if aid is not afforded till the condition has lasted long. Prevention is better than cure.

A medical student should not attend a case of labour in clothes that he has worn whilst dissecting,

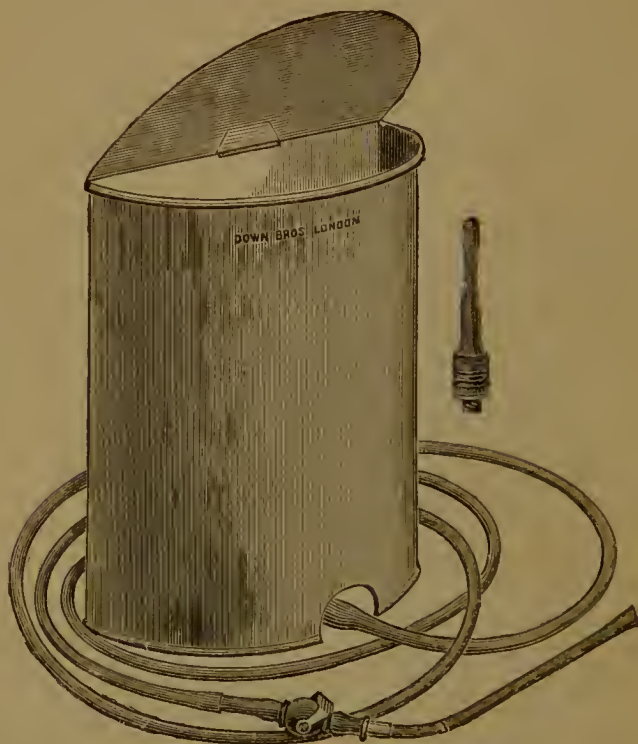


Fig. 46.—Douche Tin.

making *post mortem* examinations, or attending cases of infectious disease. A midwife or monthly nurse should wear a light-coloured cotton dress, made so that the sleeves can be turned up above the elbow. Such a dress when it is dirty will show the dirt, and

can be washed. If an apron be worn, it also should be of light colour, and of material that can be washed. The finger-nails should be kept short, that they may more easily be cleaned. Fancy rings should be taken off while the owner is in attendance on a case of labour, for it is almost impossible to be sure of keeping clean every crevice in such rings.

Things required.—Take with you a hand-bag containing the following things: A Higginson's syringe with a vaginal tube (the vaginal tube sold with the syringe had better be replaced by a glass one). If the patient can afford it, she should be told to provide herself beforehand with a douche tin (Fig. 46), by which the vagina can be douched better than with a syringe. A male gum elastic or celluloid No. 12 catheter: a pair of clean blunt-pointed scissors, some thread and a nail-brush (in case these articles should not be at hand in the house you are going to). Antiseptics: a bottle or tube containing tablets of binoiodide of mercury soluble in water, of such strength that one dissolved in a pint of water may give a 1 in 1,000 solution. Such tablets are prepared by many chemists, and sold under trade names—"tabloids," "soloids," "tabellæ," "pastilles," etc. Take also a tape measure, 60 inches long. Take, teo, an ounce bottle of a solution of corrosive sublimate in glycerine, 1 in 2,000; an ounce bottle of the liquid extract of ergot; and a bottle or box of pills, each containing one grain of opium.

Antiseptic preparations.—After entering the room, prepare with one of the tablets, in a basin, or better, a jug, if there be one big enough at the top to admit the hand, a quart of 1 in 1,000 solution. Then wash your hands in another basin with soap and water, using the nail-brush to them, and brushing the nails until there is not a speck of dirt on them. Having rinsed off the soap,

immerse your hands in the jug or basin of mercurial solution, and hold them there while you count sixty.

Preparation of the bed.—It is the duty of the monthly nurse to see that the bed is properly prepared; but whoever undertakes to attend labour ought to be able to give directions as to this, if required. A midwife will have to see to it herself. The best way to prepare the bed is to lay on it a mackintosh, over this a blanket, and over this a sheet; then another mackintosh, and on this a sheet. If the bed has been prepared in this way, after delivery the upper mackintosh can be withdrawn, and the patient left in a clean dry bed. If you have the opportunity of advising as to the choice of bed, tell the patient to lie on a mattress, not on a feather or flock bed. In the houses of the poor who do not possess the things necessary to prepare the bed in this way, the best arrangement possible in the circumstances must be made to prevent the bed from being wetted.

Dress of patient.—The best dress for the patient is a night-dress, under that a petticoat, and over these a dressing-gown. Then when the discharges become abundant the night-dress is rolled up under the arm-pits, to prevent its being wetted. It is customary for poor women whose stock of clothing is small to be delivered in their ordinary clothes, clean dry garments being reserved for putting on after delivery, and the old soiled clothes being washed during the lying-in. If the patient follow this custom, she should be told to take off her stays and drawers.

Diagnosis of pregnancy.—These preparations having been made, you have to ascertain whether the patient is pregnant, and if so, whether she is in labour. To settle the first point, look at and feel the abdomen. If the patient be pregnant, the abdomen will be enlarged, and bulging forward

(In enlargement due to fat or to dropsy, it bulges at the sides as much as in front.) On feeling it, practised hands will be able to make out the head and limbs of the child. The art of identifying parts of the child, and so finding out its position by feeling it through the abdominal walls, is a difficult one, and cannot be learnt without much practice. But it is so useful that you should lose no opportunity of gaining proficiency in it. If you can make out the position of the child, and will put your stethoscope or ear to the abdomen over the child's back, you will hear its heart beating. Each beat is a double sound, and there are from 120 to 150 beats per minute, which is much quicker than the mother's pulse. If you can hear this, you will have no doubt that the patient is pregnant and the child alive.

Next examine by the vagina. (Before doing so wash your hands, and dip them, in the manner above described, in the mercurial solution.) Lubricate the fingers you use with the glycerine of sublimate. You will feel the child's hard round head filling the pelvic brim and bulging down into the pelvis. If this be not so, the child is either in a wrong position or the pelvis is deformed, and assistance is likely to be required, and therefore aid should be sent for. Also if you are in doubt as to whether the patient be pregnant or not, further advice should be sought.

The next question is **whether the patient is in labour.**—She is not likely to have sent unless she was feeling some pain, and the question is whether the pain she has is the pain of labour—that is, of uterine contractions—or whether due to some other cause. Pains which are not due to labour are called *false pains*, and their most common cause is the presence of wind or irritating matters in the bowels. You may form some opinion as to the nature of the pains by questioning the patient.

(1) The pains of labour come on at tolerably regular intervals, while pains due to disorder of the bowels come on without any regularity.

(2) Each labour pain is like those that have gone before, and is gradual in onset and gradual in passing off, and is felt round the lower part of the stomach and back. The pains of bowel disturbance vary very much in severity and duration, one attack of pain from this cause not being always like the other pains which the patient has felt. They are not always felt in the same part of the belly, and they are not usually felt in the back.

From these features of the pain you may make a rough guess as to its nature; but you cannot make sure without examining the patient. *The pains of labour are due to contractions of the womb.* Therefore, if the pains which the patient has are of this nature, your hands on the abdomen will feel that during the pain the womb gets harder, rounder, and somewhat smaller, and projects forward more. Each contraction of the womb that takes place during the first stage of labour forces the bag of membranes into the os uteri, and this puts the os uteri on the stretch. Therefore, by the vagina you will feel that during each pain the bag of membranes bulges at the os uteri, and the rim of the os gets tight and tense. Pains which are not those of labour are not accompanied with these signs: with them there is no hardening of the uterus, bulging of the membranes, or stretching of the os.

Having ascertained that the patient is in labour, the next thing is to make sure that everything is normal: the child's head of natural size, and the child in a favourable position; the mother's pelvis of normal size, and the soft parts healthy. Anything abnormal in these respects should be found out as early as possible.

If the pelvis is well shaped and of not less than average size, and the child of not more than average size and in a favourable position, the head at the beginning of labour will be so deeply sunk in the pelvis that you cannot feel its greatest diameter above the brim. If by the abdomen you can press your fingers below the greatest diameter of the head, there is something abnormal, and you should send for assistance.

If you are in doubt as to any of these points, seek further advice.

Management of the first stage of labour.

—The great points in the management of the first stage of labour are to *keep the membranes unruptured*, and to *maintain the patient's strength*. Restrain the patient from bearing down. Tell her that the labour is only beginning, and that to try and help it by straining is at this stage useless. Let as much nourishment be given as she will take, and as to kind, any for which she has appetite, but no stimulants. Patients usually have not much inclination for large meals while labour is in progress, and prefer the light diet commonly known as "slops"; but if a patient wishes for something more substantial, there is no reason why it should be forbidden; she should, however, be warned that it may make her sick. There is no need at this stage for confining the patient to any one position; she may walk, sit, lie, or stand, just as she feels inclined. If she have any desire to go to sleep, she should be advised to try to do so. Having once ascertained that everything is right, examine no oftener than is absolutely necessary during the first stage. If by the time the os uteri has become dilated to four-fifths of its full size, the membranes are still unruptured, rupture them by scratching through them with the finger-nail.

In the second stage of labour.—During

this stage the chief business of the attendant is to see that the labour goes on with speed proportionate to the number and strength of the pains. With strong and frequent pains the head ought to advance quickly, and the second stage be over in a couple of hours. If it does not, there is probably mechanical obstruction, and assistance should be sought. If the pains are weak and infrequent, delay is to be expected. If the patient be very tired, the pains may cease—that is, *secondary uterine inertia* may come on. The treatment of this condition is, to let the patient sleep. When she wakes she will be refreshed, and pains will return. The head should advance with each pain, and recede in the intervals of pain. If it does not—if it sticks fast, neither advancing nor receding—it is said to be *impacted*, and when this is the case assistance is urgently necessary. In a natural state of things, with a pelvis not undersized, and a head not larger than usual, no obstacle to delivery is offered by the pelvic bones; and the second stage of labour is simply the time occupied by the stretching of the soft parts which form the posterior part of the pelvic floor.

Prevention of injury to perineum.—The part most stretched is the perineum. This structure is in first labours generally torn a little; and it is part of the attendant's duty to do all that can be done to prevent the perineum from being torn extensively. The way to do this is to press on the head so as to prevent it from coming out too fast and so stretching the perineum too quickly. A great tear of the perineum is likely to be produced if a large head comes out quickly. It used to be recommended to press on the perineum to "support" it. This is quite useless. Suppose anyone with a sleeve so tight that the arm cannot be bent without tearing the sleeve over the elbow. Would the tearing of the sleeve be prevented by pressing on it over the elbow? It has

also been advised to press the sides of the perineum towards the centre. Try to do this, and you will find that the skin of the perineum is so slippery that it is quite impossible. The perineum is torn when there is a big head which comes out too quickly, or when the shoulders come out too quickly. You cannot alter the size of the head or of the shoulders, but you can take care by pressing back the advancing part, if necessary, that it does not come out so quickly as not to give the perineum time to stretch. Do not try to pull the shoulders out in the absence of a pain.

The **separation of the child** is your next duty. There should be ready two ligatures, each composed of about half-a-dozen pieces of thread about a foot long, knotted together at each end. When the child is born, you will feel the cord pulsating throughout its whole length. If you wait a few minutes, the pulsation in the cord will gradually lessen in vigour, and the cord will get collapsed and flabby ; this change beginning at the part farthest away from the child. The flabbiness of the cord is due to some of the blood that was in it and in the placenta being sucked into the child by the movements of breathing, which expand the lungs, so that blood is required to fill them. The cord should not be tied until this change in it has taken place ; because if it is tied too soon the blood which ought to have been drawn into the child is lost to it, remaining in the placenta and cord, and the child is so much the weaker for its loss.

When the cord is thus empty of blood, it should be tied with one of the ligatures placed about two inches from the umbilicus. If the ligature is too thin, it will cut through the cord ; if too thick, it cannot be pulled tight enough. The other ligature should be put about two inches farther from the umbilicus. If there be not another child, no harm will result from not applying this second ligature ; but without it,

more blood will spurt over the child when the cord is cut, so that it is cleaner to tie it. When tied, the cord is cut between the two ligatures. Hold the cord while cutting it between the fingers of the left hand, with the knuckles turned to the child's abdomen, so that the cutting is done in the hollow of the hand, and thus nothing else but the cord can be cut. Take care that the cord is not dragged upon. The cut end of the cord should then be wiped, to see that no oozing takes place. If there is oozing the ligature is not firm, and another one must be put on.

While waiting for the pulsation in the cord to cease, carefully wipe the child's eyes, mouth, throat, and nose with a clean napkin.

Management of the third stage of labour.

—This is one of the most important parts of your duty. The great danger of the third stage of labour is hæmorrhage. When this occurs, it so quickly puts the patient's life in danger that if the attendant cannot stop it the patient will die before a doctor be got. Therefore, no one is fit to undertake the management of labour who does not know how to prevent and stop hæmorrhage in the third stage of labour.

The duty you have to perform may be divided into three parts.

First—to observe the expulsion of the placenta from the uterus into the vagina, and see that it takes place properly, and is not accompanied with too much bleeding.

Second—to deliver the placenta and membranes.

Third—to see that the uterus is properly retracted and contracted after the placenta and membranes have been delivered.

First.—Immediately after the child is born, and the navel-string tied and cut, let the child, wrapped in the flannel receiver, be laid in a safe place near the fire, and put your hand on the mother's abdomen.

You will (unless it be a case of twins) feel the uterus nearly as large as an adult head. It may be somewhat soft and doughy, or it may be firm and hard, according to whether a contraction is present or not; but it should be quite well defined. If soft when you first put your hand on it, you will soon feel it contract, and get harder and smaller. . Keep your hand on it so as to be sure that proper contraction is present. If the uterus gets large, flabby, loose, and shapeless, there is hæmorrhage. But if the womb maintains its proper size and shape, contractions will follow one another, and will expel the placenta into the vagina; as the placenta passes out you will feel the uterus gradually getting smaller and smaller, until it is no bigger than a foetal head. Do not try to interfere with or hasten this process. All you have to do is to feel that it is going on properly. It takes from fifteen to thirty minutes for the uterus, with three or four pains, to expel the placenta into the vagina. If at the end of half-an-hour the uterus feels still so large that you think the placenta is still inside it, examine by the vagina, and follow up the cord, and see if the placenta is still within the womb. If it is, and there is not much hæmorrhage, wait half-an-hour more. If there be hæmorrhage, or if after an hour the placenta is still in the uterus, send for aid. But if the case goes on properly, at the end of fifteen or thirty minutes the uterus will be firmly contracted, and not bigger than a foetal head. When the uterus feels as small as this, you will know the placenta has been expelled into the vagina.

Second.—Now put your hand on the uterus, and press firmly downwards and backwards (Fig. 47). By this means you will press the placenta out of the vagina; you will see it emerge with the foetal surface first, the membranes following it. When it is outside the vulva, take it, and very gently turn it round and

round, so as to twist the membranes as it were into a rope. This will help to prevent a piece of membrane from being broken off and retained. When the membranes are free, the placenta and membranes are received in a bowl or other utensil; it is customary afterwards to burn them.

Third.—Lastly, having delivered the placenta and



Fig. 47.—Showing Mode of Expulsion of Placenta.

membranes, put your hand again on the abdomen. The uterus should be retracted, that is, no bigger than a foetal head, firm, and perfectly distinct and definite in shape; every now and then it hardens when a contraction comes on. Keep your hand on the abdomen for about ten minutes, to see that this state of things persists; for if the uterus is properly retracted, there will be no hæmorrhage. Also count the pulse. It ought to be slow, not over seventy beats per minute. If it be over 100 there is

danger of hæmorrhage, and need for very careful watching of the patient. But if the pulse be slow, and the uterus retracted, the labour may be considered over.

Objections to too early squeezing out of placenta.—It is bad practice to try to squeeze out the placenta too soon; first, because, if you try to press out the placenta before it is fully expelled into the vagina, you will have to press and knead the abdomen a great deal more, which will cause the patient unnecessary pain; and secondly, because in this manner the placenta may be squeezed out before the membranes are properly separated from the uterus, and a piece of membrane may be broken off and retained in the womb, and cause hæmorrhage.

Examination of placenta.—To be additionally sure that the placenta and membranes have completely come away, *examine the placenta* by putting it in a basin of water, with the uterine surface uppermost. This will float out the placental tufts, and you will at once see the gap if the placenta has been broken. Examine also the membranes; strip the chorion off the amnion, and thus be certain that the two membranes are present.

Antiseptic douche.—When everything is finished, the placenta and membranes removed, the pulse quiet, the womb well retracted, give a vaginal douche of a quart of a 1 in 2,000 solution of biniodide of mercury, at the temperature of between 100° and 105°. The most important antiseptic precautions are those which you should take about your own hands, and the things you use; next to these comes the douche immediately after labour. After giving the douche, turn the patient on her back, and by pressing on the abdomen, press out any fluid that may be retained in the vagina. This is very important, because if several tablespoonfuls of the solution are

left in the vagina, they may be absorbed, and may poison the patient.

Attention to patient's comfort.—When you have given the douche, and again satisfied yourself that proper retraction of the uterus is present, the next thing is to make the patient dry and comfortable. Take the bottom of the soap dish, a bowl, or a saucer,

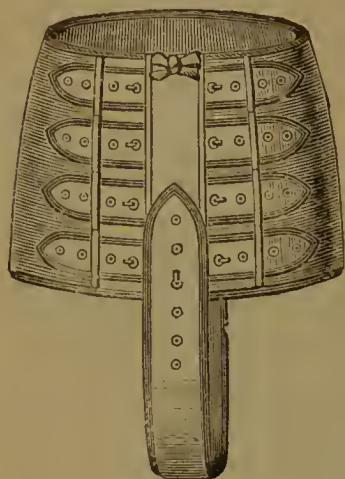


Fig. 48.—Surgical Instrument Maker's Binder.

and scoop up the fluid and clots from the hollow in which the patient lies, and empty it into the utensil. The garments which have been soiled during delivery should be removed. Then, with a clean napkin dipped in warm water, the buttocks and thighs of the patient should be made quite clean. A clean warm napkin or pad of absorbent wool should be put to the vulva, and the patient moved over towards the opposite side of the bed, where the sheet is dry. Now the soiled

sheet, with the mackintosh under it, should be withdrawn. If the patient has been confined in her everyday clothes, a clean dry night-dress should presently be put on by the nurse.

The binder.—It is customary at or before this time to apply the binder. This is a broad firm bandage put round the patient's abdomen. It is valuable for the feeling of warmth and support which it gives the patient, and most women like to have it for this reason. But it is not beneficial in any other way, and, therefore, if the patient does not like it, there is no need for

pressing her to submit to it. Some women like to have their waist measurement kept small, and there are some few who follow employments in which it is really important to them to keep their waists as slender as possible. With an ordinary binder one cannot produce any effect of this kind. To do this, the patient must have a specially constructed binder, such as are sold by surgical instrument makers, provided with straps and buckles by which it can be pulled as tight as the patient can bear (Fig. 48). Such compression is injurious, and the medical attendant ought to advise against it. The enlargement of the waist which takes place in most women who have had many children is due to fat, not to any change which a binder can prevent. The ordinary binder is best made of strong huckaback towelling, a yard wide, and a yard and a quarter long, doubled lengthways. In putting it on, its lower edge should reach four inches below the top of the thigh-bone (the great trochanter). The free end of the binder should lie uppermost on the right side. Starting from the left flank, the binder should pass over the abdomen, round the back, and again over the abdomen, ending on the right flank, where, after it has been tightened and all creases smoothed out, it should be securely fastened by four strong pins. The patient's skin should be guarded by the left hand beneath, and the pins inserted in the following order, beginning from below:—One at the lower edge of the binder, three inches below the top of the thigh-bone, and a second a similar distance below the top of the hip-bone, both fastening the binder tightly, serving to keep it in position, and preventing it from riding up. The third should hold the binder still more firmly on a level with the top of the womb; and the series is completed by a fourth applied near the upper edge of the binder, not too tightly. Straight pins, two inches long, or safety pins may be employed.

CHAPTER V.

DIAGNOSIS.

You should take every opportunity of practising yourself in making out the position of the child by feeling it through the abdomen. This is at first difficult, but with practice becomes, in most cases, easy; and it is very useful.

What to ascertain.—By external examination you can make out the *position* of the child; you can feel its head, back, breech, and limbs. You can tell whether it is large or small; and from this you can judge whether the patient has gone to full term or not. You can also tell *whether the head has descended into the pelvis*, or whether it is still so high up that its largest measurement is above the brim. This is a most important point in forecasting the difficulty of labour. By noticing it you can suspect the existence of *pelvic deformity* or of excessive *size of the child's head* long before any sign of obstructed labour has developed. There is scarcely anything in midwifery that will better repay you for the trouble taken in acquiring it than skill in the external method of examination.

Method of examination.—The patient should lie upon her back, with a pillow under her head. Her stays should have been taken off, and the waistbands of her garments loosened and lowered, so that her abdomen may be quite uncovered. Her legs should be a little drawn up, and the knees slightly separated (Fig. 49).

Measurements.—Measure with a tape measure the greatest girth of the belly. In a young woman who is not fat, it is usually, at full term, about 36

inches. Measure also from the upper border of the symphysis pubis to the highest point of the uterus, over its convexity. This measurement should be

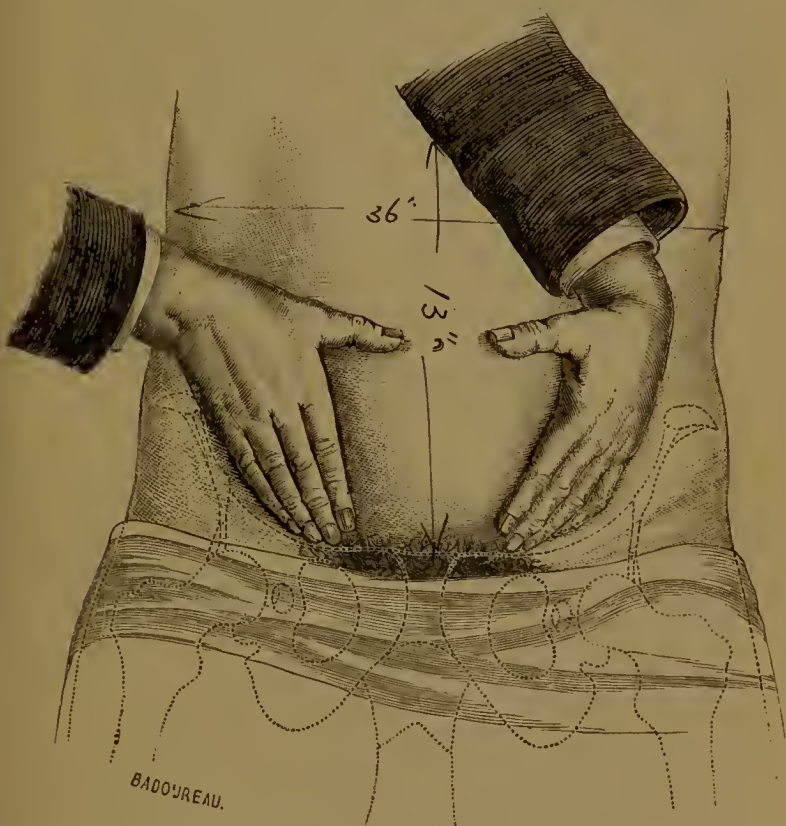


Fig. 49.—Method of Abdominal Palpation.

about 13 inches. If these measurements are much exceeded, and the patient is not so fat that her obesity will account for the increase, it may be either that the child is too large, that twins are present, that there is excess of liquor amnii, or some morbid condition within the abdomen, and you had better

send for a doctor that he may find out why the belly is so large.

Examination.—Then put your hands upon the abdomen to find out whether *the uterus* is contracted or not. If it be contracted it will feel rounded and hard, and you must wait two or three minutes, until the contraction has passed off. When the uterus has relaxed, then go on with the examination. Put one hand on each side, quite low down. To make sure that your hands are in the right position, begin by feeling the crests of the iliac bones on each side, and the symphysis pubis in front. When you feel these points you will know where the brim of the pelvis lies. Then press the tips of the fingers on each side well down into the pelvic brim, and towards one another. In nineteen cases out of twenty you will feel between them a large, hard rounded body, which fills the pelvic brim. This is the *foetal head*. Its size, its hardness, and its roundness are its distinguishing marks. The breech is nearly as large, but it is not so hard, and not so round. If the head is low down in the pelvis, it is pretty certain not only that the case is one of head, but that it is one of vertex presentation; for when the head presents in any other position, it does not usually descend low into the pelvis early in labour. You may also infer that the pelvis is large enough.

Continuing the examination, feel the head all round with your fingers; and if you are dexterous you will find that while on one side there is nothing distinctly marking off the head from the parts above, on the other side the hard mass of the head projects, and prevents you from pressing your fingers down into the brim. This projecting part is probably the forehead, and the smoother side along which you can more easily press the fingers into the brim is the occiput.

You may feel that the greatest diameter of the head globe is above the pelvic brim. If so, it has not yet entered the brim, and it is most important to find out whether it can enter. Prop the patient up with pillows, so that her trunk may be in a position half-way between that which it occupies in the upright and the recumbent postures. In this position the long axis of the uterus will be vertical, and as nearly as possible perpendicular to the pelvic brim. Sometimes the head will now sink into the brim. If it does not, put your hands on the abdomen, with your finger-tips opposite the child's neck, and by pressure on its two ends, try and push it down into the brim. If you find that you cannot make it enter the brim, send at once for assistance.

Now proceed to confirm or correct this opinion by examining other parts of the abdominal swelling. At the top of the uterus, if the head be in the pelvic brim, will be felt the *breech*. It is nearly as large as the head, but less regularly rounded, and not so hard. Near it will be some small, hard, movable knobs; these are the *feet*. If the legs should be extended, these will not be felt near the breech; and if the back be turned forward, so that the feet are behind, this may prevent you from feeling them. Having thus identified the two extremities of the foetus, the next thing is to find out which way its *back* is turned. On the side to which the back lies there will be felt a continuous smooth resisting surface, extending from the breech to the occiput of the child. This is not so easily felt as the head or the breech, because it is more yielding, and may be separated by liquor amnii from the wall of the uterus. If it cannot be made out by steady pressure, then by sudden but gentle pressure with the tips of the fingers try to displace the liquor amnii, and so come upon the parts of the child beneath. Having ascertained to which side the

back is turned, then try to identify the abdomen on the opposite side. Here the fingers come upon no firm resisting surface, but feel instead small hard knobs, which can be moved; these are the *limbs* of the fœtus. If the child's back be turned forwards you may not be able to feel the limbs. In the first position, which is that in which three children out of four lie, the back is turned to the front and the left side; and the limbs, or some of them, may be felt behind and to the right. If you put your stethoscope to the abdomen, you will hear the fœtal heart more loudly on the side to which the back is turned.

These things cannot be felt with equal ease in all patients. In a fat or a nervous woman, who strains very much, it may be difficult to feel the parts of the child, and so it will if there be a great deal of liquor amnii. But the more you practise this, the easier it will become, and you will, after a time, get so accustomed to the feel of the parts when the child is lying properly, that you will quickly recognise when the child is in a wrong position. It is of great value to be able to detect early that the presentation is not normal, even if you should not be able at once to find out what the position of the child really is.

In a **transverse presentation**, when you try to press your fingers down into the pelvic brim you will find one end of the fœtal ovoid, viz. the head, lying in one iliac fossa, while the opposite end will be high up on the other side of the abdomen. You will identify the head by its size, its hardness, and its roundness. Do not think that the presentation cannot be transverse because the uterus looks as if it were the natural shape; for, although before labour the child may have been lying quite across the abdomen, yet, when uterine contractions become strong, the contracting uterus so presses the child towards the middle line that the uterus becomes

almost natural in shape. But, on careful palpation, after the contraction has passed off, it will be found that the position of the child is not what it should be.

In **breech presentations** the head is at the fundus uteri. In these cases, for reasons elsewhere explained, if the patient be examined early, the presenting part will often be found not to have sunk into the pelvic brim, but to be lying above it, and often rather to one side. The parts are identified by the same characters that they present when the child is in a normal position: viz. the head by its large size, roundness, and hardness; the back by the large smooth convex surface which it presents; the abdominal surface by the small knobs formed by the limbs. If you have by practice become dexterous in recognising by the hands these three points—the head, the back, and the abdomen of the child—you will easily make out, not only whether the head or the breech is presenting, but also in which position the child is lying: whether the occiput is behind or in front, to the right or to the left.

It is possible by feeling the abdomen to distinguish a **face presentation**. If the face be presenting, the head will be felt lying above or in the brim of the pelvis. On carefully feeling the head all round, it will be found that, as in vertex presentations, one side of the head projects more, and is marked off from the body by a deeper and sharper hollow than the other. If the face be presenting, this groove or hollow is deeper, and more distinct than usual, and is situated on the side to which the back of the fœtus is turned, instead of the abdominal surface, as in vertex presentations.

Having formed the best opinion you can by external examination, proceed to make your opinion still more accurate by *internal examination*, and by *combined* internal and external examination.

Internal examination is made by the vagina. It may be made either with the patient on her back or lying on one side. The clearest idea of the position of the head is gained by examining with the patient on her back, and the combined examination can be made better in this position than in any other. The only objection to it is that in Great Britain it is unusual, and therefore the patient may not like it. The usual position is for the patient to be on her left side. In some few cases, which will be afterwards mentioned, it is better for the patient to lie on her right side.

The examination is made by putting two fingers into the vagina. One finger alone will not always reach high enough. Accustom yourself to examine with either hand. With the patient on her left side, and lying across the bed, the left hand is the better, because then the front of the finger-tips comes against the presenting part. If the patient be on her back, or lying with her head towards the head of the bed, instead of across it, the use of the right hand is more convenient. Before examining, the fingers should be lubricated by dipping them in the 1 in 2,000 solution of corrosive sublimate in glycerine.

The first thing to be found out by internal examination is the **state of the vagina**. It ought to be soft, not tender, not hot, bathed with plenty of mucous secretion, and capacious. If it be tender, not soft and slippery, and not well moistened by secretions, it is a bad sign; and if it be contracted, or there be any swelling projecting into it, and narrowing it or blocking it up, assistance should be sought.

The next thing is the **state of the os uteri**. If the labour have come on prematurely the cervical canal may not yet have been completely opened up. Then your finger will enter the canal of the cervix, with the external os at the lowest part, the internal

os above. Later on you will feel the external os only as a round hole, with a thin soft rim through which the bag of membranes protrudes in the shape of a watch-glass (Fig. 50). The margin of the os should be stretched and

tense during each pain, but soft and loose between the pains. If it be hard and thick, it is a bad sign. After it has become dilated to the size of a shilling or more, its margin should be smooth and uniform in thickness and hardness all the way round. If there is a lump at one



Fig 50.—The Membranes bulging at the Os Uteri.

of greater hardness than the rest, or if it feels ragged and uneven, assistance should be sent for.

The size of the os uteri shows the degree to which the first stage of labour has advanced. If the cervical canal has not been opened up, you may leave the patient for three or four hours at a time. In a first labour you may do so if the os uteri is not larger than a crown piece. When it has reached this size, or, in a woman who has had children before, when the os

uteri has become dilated to the size of a shilling, you should not go far away. Judge of the rapidity with which labour is likely to be over by the frequency of the pains and their strength, and the depth to which the head has engaged in the pelvic brim. Estimate their strength by the degree to which the os uteri is made tense and the bag of membranes made to protrude, and



Fig. 51.—First Vertex Position. (*After Farabeuf.*)

by the length of time that the tension and protrusion last. But there are so many circumstances that may influence the duration of labour that it is imprudent to commit yourself to any statement as to when the child is likely to be born. Form your own opinion; but to the patient and her friends merely say that everything is going on well, but that you cannot tell when the labour will be over.

Having ascertained that the vagina and cervix uteri are healthy, next verify the impression you gained from the abdominal examination, as to the **position of the child.**

If the head be presenting you will not only more clearly appreciate its hardness and roundness, but with the finger introduced in the interval between two pains into the os uteri you will feel what distinguishes the head from every other part of the body : viz. the sutures and fontanelles. Do not try to feel sutures or fontanelles during a pain, lest you



Fig. 52.—Second Vertex Position. (*After Farabeuf.*)

should rupture the membranes by pressing on them while they are tense. During labour the bones are so pressed together that the posterior fontanelle is not to be felt as an open space, but as a spot at which three sutures meet ; and the anterior is much smaller than it is after the child is born. Running from the spot at which three sutures meet to that at which four sutures meet is the sagittal suture. By feeling these lines you can make sure of the position of the head. The sagittal suture shows in which direction the length of the head lies ; the meeting place of three sutures marks the back of the head, the anterior fontanelle

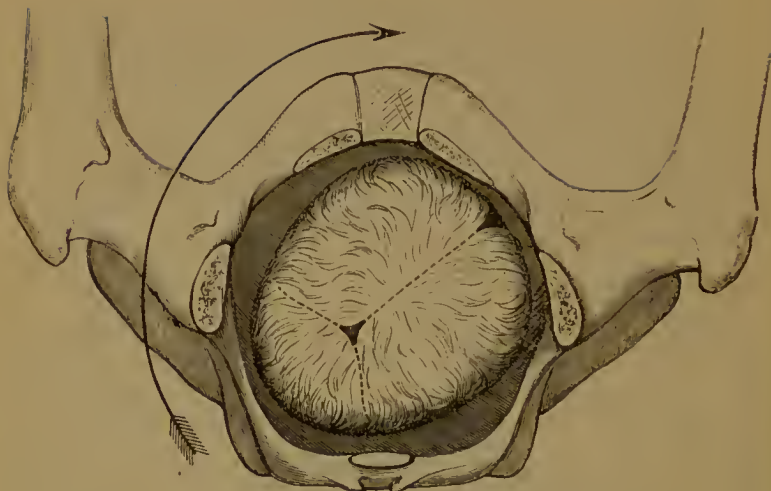


Fig. 53.—Third Vertex Position. (*After Farabeuf.*)

the front. Make yourself quite sure by combining the two methods of examination. With the hand outside feel the smooth resisting surface of the back on the side to which the fingers in the vagina tell you the occiput

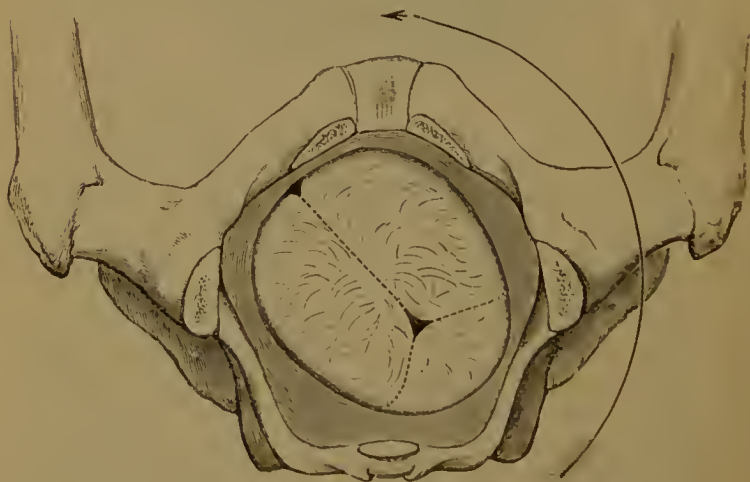


Fig. 54.—Fourth Vertex Position. (*After Farabeuf.*)

lies, and the little movable knobs formed by the limbs on the side to which the forehead looks. The projection felt at the lower part of the abdomen, which you take to be the face and chin of the child, you will know to be such by pressing on it while the finger in the vagina is in contact with the occiput,

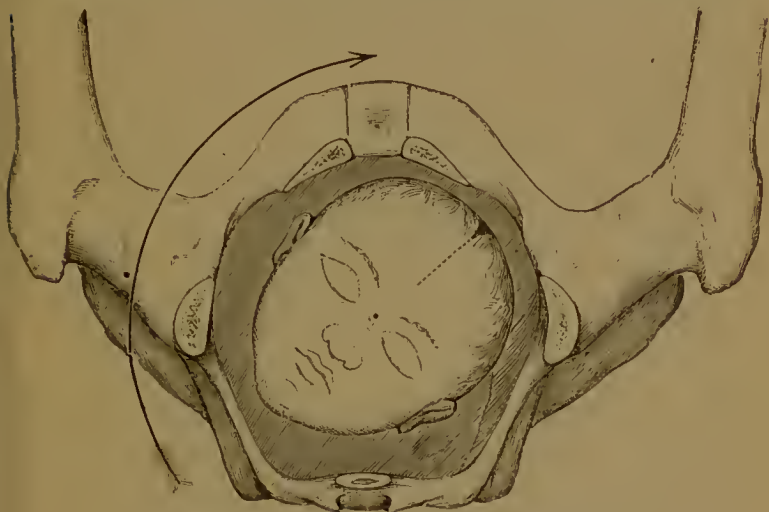


Fig. 55.—First Face Position. (After Faraheuf.)

and noticing that each pressure imparted to it at once produces movement of the occiput. Then make yourself quite certain of the position of the child. In the *first position* (Fig. 51)—the commonest—you will find the meeting place of three sutures forwards and to the left, that of four behind and to the right, and the saggittal suture joining them running obliquely from the front and the left to the back and the right. In the *second position* the posterior fontanelle is forwards and to the right, the anterior behind and to the left (Fig. 52). In the *third position* the posterior fontanelle is behind and to the right, the anterior forwards and to the left (Fig. 53). In the *fourth position* the pos-

terior fontanelle is behind and to the left, the anterior forwards and to the right (Fig. 54).

It is very important to make out the position of the child as early as possible: because, before the membranes are ruptured, and the head engaged in the pelvis, it is easy enough to change an unfavourable



Fig. 56.—Second Face Position. (*After Farabeuf.*)

position into a favourable one. If the back of the child be behind, it is quite easy with the hands on the abdomen to push it round, and make the occiput come to the front. If neither by abdominal examination, nor by feeling the sutures and fontanelles, you can satisfy yourself as to the position of the head, press two fingers high up in front and feel for an ear. The way the ear points will direct you to the occiput.

If the face be presenting, the examining finger instead of meeting the round smooth vault of the skull, intersected by its sutures, will feel the projections and hollows formed by the features: the nose, eyes, and mouth. Of these, the one most easily identified is the mouth. Put your finger in the

mouth, and feel the gums and tongue ; nothing like these is felt in any other part of the body. If you think the face may be presenting, you should be very careful how you examine ; for by roughly pushing or scratching with the finger injury may be done to the child's eyes. On examining, with the two hands together, the abdominal hand will feel the round



Fig. 57.—Third Face Position. (After Farabeuf.)

projection of the occiput on the side opposite to that to which the chin points, and above this will be a recess, owing to the spine being carried forwards in consequence of the extreme extension of the head. On the opposite side the limbs will be felt more easily than usual, for the same reason ; and the child's heart will be heard best on the side to which its chest is turned, instead of over its back as usual. Having ascertained that the presentation is of the face, note its position. In the *first position* the chin is behind and to the right, the forehead forwards and to the left (Fig. 55). In the *second position* the chin is behind and to the left, the forehead forwards and to the

right (Fig. 56). These two positions are the unfavourable ones, for in them, if the child be of full size, it cannot be born unless its position changes. In the *third position* the chin is forward and to the left, the forehead behind and to the right (Fig. 57). In the *fourth position* the chin is forwards and to the right, the forehead behind and to the left (Fig.



Fig8. 5.—Fourth Face Position. (After Farabeuf.)

58). These positions are favourable: in them the danger either to mother or child is not much more than in an ordinary vertex presentation. When cases of face presentations in the first or second position terminate favourably they do so by changing into third or fourth positions. Therefore, if, before the membranes have ruptured, you are able to make sure that the face is presenting with the chin behind and the occiput in front, it is in some cases a good practice to turn the child round by pressure on the occiput through the abdominal walls, so as to get the occiput behind. But do not attempt this without the sanction of your superior officer.

The breech does not form quite so large a tumour as the head, and it is not so hard. When you examine by the vagina you can feel no sutures or fontanelles, but you can feel the deep cleft of the nates dividing the presenting part into two portions. At one end of this cleft you can feel the genital organs of the child, and at the other end the point of the sacrum. In front of this is the anus, which the finger may possibly enter, and so become stained with meconium. The anus can scarcely be mistaken for the mouth, because there is nothing about it that feels in the least like the gums. The parts on each side of the cleft are exactly like one another, which distinguishes it from the recess between the ribs and arms leading up to the armpit, in which the arm is felt on one side, and the ribs on the other.

The position of the child will be made out by noticing, with the finger in the vagina, which way the sacrum looks ; and finding this, confirm the impression gained by external examination as to the direction of the child's back. In the *first position* the back is forward and to the left ; in the *second*, forward and to the right ; in the *third*, behind and to the right ; and in the *fourth*, behind and to the left.

If one of the limbs is felt presenting, care is needed to distinguish an elbow from a knee. The elbow presents a point with a hollow on each side of it. The knee, when bent, presents a depression in the middle, with a bony prominence on each side. The foot has to be distinguished from the hand. To do this, remember that the great toe is on a line with the other toes, and parallel to them, and that the heel projects beyond the line of the leg. In the hand the thumb opposes the fingers, or if extended, is not parallel to them ; and there is no part of the hand which projects like the heel.

CHAPTER VI.

MANAGEMENT OF BREECH AND FOOTLING CASES.

LABOUR with the breech or lower limbs presenting is not more dangerous to the mother than when the head presents, but is more dangerous to the child.

The **danger to the child** is from the cord being compressed between the head and the pelvis. Hence, to save the child, the head must be delivered quickly. This cannot be done unless the passages are well dilated. Therefore the essential point in the management of breech or footling cases is *not to hurry* the delivery of the child until the body is born; for we shall thus get the soft parts more thoroughly dilated. The cord can scarcely be injuriously pressed on so long as the membranes are unruptured. For this reason, and also because the bag of membranes dilates the passages better than anything else, try in a pelvic presentation to *keep the membranes unruptured* as long as possible. Breech presentations are more favourable than footling, because the pelvic end of the child takes up more room when the legs are doubled up by the breech, and therefore when the legs are in this position the soft parts are better dilated.

When the breech and legs are born you will be able to feel the umbilical cord. Trace it up into the womb, and if it pass up opposite the sacral promontory (where it will be exposed to strong pressure by the head), push it towards one side, opposite a sacro-iliac synchondrosis, where it will be less pressed on. If you have not hurried the birth of the breech and legs, the arms will probably be crossed in front of the chest. Put a finger in the elbow, and thus bring each arm down.

Now **deliver the head** as quickly as possible. If everything be normal, and you have not pulled upon the body, the head will have entered the pelvis in a flexed position, and with the face backwards. If during the birth of the trunk the abdomen

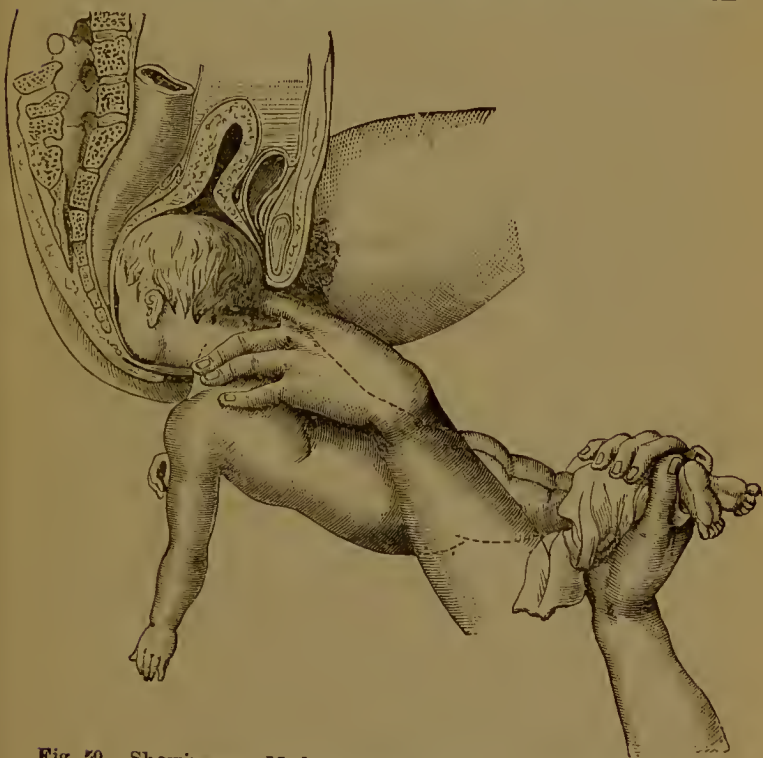


Fig. 39.—Showing one Mode of Delivering the after-coming Head.
(From Galabin.)

was anterior, the head will have rotated as it descended so as to bring the face backwards. If then you can feel the chin low down, carry the body of the child with the right hand high up towards the mother's abdomen, and put the left hand on the uterus. By rubbing and pressing over the uterus,

stimulate it to contraction, and help it to press out the child's head. Then during a uterine contraction draw the child's body forwards. This will bend the head. The chin will emerge over the perineum, and the mouth, nose, and eyes will successively appear. Get anyone in the room who can assist you to press on the uterus, and put a finger of your left hand on each shoulder of the child (Fig. 59). Judge of the necessity for speed in doing this by the state of the cord. If the cord be pulsating at the normal rate the child is living, and the need for immediate delivery not very urgent; but if it pulsate slowly and irregularly, then, unless the child is quickly delivered, it will die.

Bringing down the arms.—Sometimes the arms are extended up by the sides of the head. If this be so, you will have to bring them down; and this is sometimes a most difficult task. Draw the child's body gently downwards, holding it by the pelvis. Pass up the hand corresponding to the arm that you are going to bring down along the side of the child rather on the dorsal than on the abdominal aspect, until you can feel the child's elbow with your fingertips. Then place your fore and middle fingers one on each side of the child's humerus, so that they may protect it like a splint; and with the tip of one finger in the bend of the elbow joint, move the elbow down across the child's face (Fig. 60).

You must not try to get the arm down by pressing on a part of it higher than the elbow; if you do this, you will very likely break the arm. It is better to try first to get the posterior arm, because there is more room for your hand in the hollow of the sacrum. But if you cannot manage to get down the posterior arm, try the anterior. It is not very important which you take first.

Arrest of head above brim.—In some cases, when the pelvis is contracted or the head very large,

the head does not enter the pelvis, but remains arrested at the brim. When the head stops in this situation it is no use carrying the child's body forwards. You must then put two fingers of one hand on the child's shoulders, and a finger of the other



Fig. 60. —Showing how to bring down the Arms when they are up by the sides of the Head. (*After Farabeuf.*)

hand in the child's mouth. With this hold pull downwards and backwards during a uterine contraction, till the head has passed the brim; at the same time getting an assistant to press on the uterus, in a direction downwards and backwards, through the abdominal wall. If you cannot succeed in this, send for aid.

CHAPTER VII.

DELAY IN LABOUR.

LABOUR may be prolonged from

- (1) Premature rupture of the membranes.
- (2) Deficient power in the uterus ; or from
- (3) *Obstruction*, which may arise from wrong position of the child, excessive size of the child or some part of it, contraction of the pelvis, disease of the soft parts. It is most important to distinguish between a uterus powerless in itself, and one which appears powerless because it cannot overcome an obstruction. The first two causes are those which most commonly occasion delay in the first stage.

The effect of premature rupture of the membranes has already been described. (*See chapter ii.*)

The cause of delay in the first stage of labour may be in the cervix itself. This is rare.

Rigidity of the cervix may delay the first stage of labour. The most common cause of rigidity of the cervix is premature rupture of the membranes ; but it may come from other causes. It has been explained that in the last few days of pregnancy the internal os becomes gradually opened up, and the cavity of the cervix made one with the general uterine cavity, without the patient feeling pain. This is the preparatory stage of labour. Now, if from any cause pregnancy is terminated prematurely, labour may come on before this preparatory stage has been completed, or even begun. If this be so, of course the first stage of labour will be long, on account of the *unprepared condition of the cervix*. A slow first stage of labour from this cause is natural in premature labour.

The cervix may be *diseased*. It may be affected with cancer ; it may have been at some former time ulcerated or otherwise damaged, and the damage may have left behind it a great deal of scar-tissue, which is hard, fibrous, and stretches badly ; there may be a tumour in it. Any one acquainted with the natural feel of the parts ought without much difficulty to recognise that something is wrong. The cervix does not feel everywhere soft, smooth, and even, as it ought to do. If you think that the cervix is unhealthy, send for assistance. Cases of this sort are very uncommon, and so this is a difficulty we seldom have to do with.

Any *obstruction* may cause delay in the first stage of labour. If the pelvis is so contracted, or the head so large, that the head cannot come down into the pelvis, it cannot press into the os uteri as it ought to do, nor can the part which presents if the child be lying transversely. It does not fill up the circle of the os, and thus dam off the portion of the waters in front of it from the rest, as it should do. Hence the part of the bag of waters in advance is exposed to the full pressure of the uterus and weight of the waters, and in consequence the membranes bulge down much more than is usual in normal cases, forming early in labour a long process like the finger of a glove ; and they are very liable to break early. If they break early, the dilatation has to be finished by the contractions of the longitudinal fibres of the uterus pulling up the cervix without the help of the usual stretching open of the cervix by the head. In such a case you will feel the cervix hanging down like a loose, thick, soft fringe below the presenting part : this being high up, not pressing into the cervix at all during the pains.

If you have made a thorough examination of the abdomen at the beginning of labour, you will have

detected the wrong position of the child, or you will have found that the largest measurement of the head was high above the pelvic brim, and could not be pressed into it; and from these signs you should diagnose probable obstruction at the brim without waiting to see the effect of the pains, and therefore send early for help. You may be able to reach the sacral promontory easily with the finger. From this sign you may infer that the pelvis is contracted, and if you think it is, send for aid without delay.

Uterine inertia. — When the pains are not strong enough in a labour in which everything else is normal, the condition is called *uterine inertia*.

In uterine inertia the pains come on at long intervals; when they do come they are short, they soon pass off, and they are weak. If you note with your finger the effect of the pains, you will find they do not make the rim of the os feel so tight and tense as strong pains ought to do, and the bag of membranes is not so powerfully forced into the os. If you put your hand on the abdomen, you will find that the uterus does not get as hard as it does with strong pains, and such hardness as there is lasts a very short time.

Uterine inertia in the first stage of labour is not a condition which exhausts the mother. It is not accompanied with any serious symptoms. The patient is quite placid and comfortable between the pains; she takes food well; her pulse is not over 100, often much under; her breathing is slow and easy.

There are two kinds of uterine inertia—primary and secondary.

Primary uterine inertia is that condition in which the pains are weak and few from the beginning of labour.

Secondary uterine inertia occurs when the pains at the beginning of labour are strong, regular,

and frequent, and then after the patient has been some hours in labour they get less and less frequent, and at the same time less powerful. This comes on when the patient has got tired. It is apt to come on when the patient, it may be from false pains or some other cause, has been sleeping badly, and so got very tired before labour began.

Uterine inertia is never a source of danger so long as the membranes are unruptured. It is very seldom a source of danger even after the membranes are ruptured, or in the second stage of labour. But in the third stage of labour it is very dangerous.

Treatment of uterine inertia.—In primary uterine inertia during the first stage of labour the only treatment is patience. The os dilates slowly; the patient may be fidgety and her friends anxious; but the dilatation will in time be completed, and so long as there is nothing but uterine inertia present there is no cause for alarm, and no need for interference. The patient must be persuaded to take as much food and drink as she can without discomfort, but no stimulant; and she should be encouraged to lie down and sleep if she feels at all drowsy. It should be impressed upon her that everything is well, except that the labour is slow.

In secondary uterine inertia the remedy is to get the patient to sleep. If the patient be let alone, she will probably go to sleep, and wake up refreshed, and the pains will return. This is Nature's cure. The best way of treating secondary uterine inertia is to imitate Nature. Give the patient a pill of one grain of opium, and if in half-an-hour she is not asleep, give her another. She will now probably sleep, and when she wakes up the pains will return with renewed vigour.

The foregoing description applies to uterine inertia in cases otherwise perfectly normal. But do

not think that because a patient has uterine inertia therefore there cannot be anything else wrong. Many complications of labour which are dangerous in other ways are liable to cause uterine inertia. Do not conclude that uterine inertia is the *sole* cause of delay until you have made a most careful examination. If you are in doubt, send for assistance.

Relative weakness of pains.—The uterus may be relatively weak. That is, there may be regular and frequent pains, quite strong enough to quickly drive a child of average size through a normal pelvis, but in consequence of large size of the child or smallness of the pelvis, the resistance to the progress of the child may be greater than the uterus can overcome within the usual limit of time. If such a case be left unassisted, one of two events must happen. Either the child *will* at length be born, but only after a very long labour, greatly exhausting the mother and possibly seriously injuring both mother and child: or the child *will not* be born, and the state of things described in the next paragraph will gradually develop.

Obstructed labour.—If, either from pelvic contraction, or from large size, or wrong position of the child, it cannot be born, and no help is given, the pains go on occurring with shorter and shorter intervals, until at length there is no interval at all, the pains merge into one another, and the uterus remains continuously contracted. This condition is called *tonic contraction of the uterus*. When this condition has come on, the patient is in great danger; every hour adds to the danger, and if help be not given she will die. The patient begins to look anxious. She is restless, is thirsty, and her tongue and lips look parched and brown. The pulse becomes quicker and smaller, and the longer the condition continues unrelieved the smaller the pulse gets. The breathing becomes hurried in proportion to the pulse.

This state of things may continue, getting worse and worse, until the patient dies undelivered, worn out by exhaustion. Tonic contraction of the uterus is rare in the first stage of labour.

Rupture of the uterus.—But the case may end in a different way. The upper part of the uterus, which has to contract to expel the child, goes on getting smaller, and harder, and thicker. The lower part, which has to stretch to let the child pass, is pulled by the upper part higher and higher up, while it is fixed below by being nipped between the head and the pelvic brim. Hence it is more and more stretched, and gets thinner and thinner. The division between the two parts can be felt by external examination as a furrow running from side to side across the front of the uterus, and this furrow rises higher and higher as the upper part is more and more contracted and the lower part more and more stretched. At length the lower part is stretched till it can stretch no more, and it gives way; *rupture of the uterus* occurs. The attendant ought to foresee this, and not let things get to such a pass that the uterus ruptures.

Rupture of the uterus may occur before the uterine contractions have become tonic; for in some very rare cases it is due to disease of the womb, which gives way without any obstruction. These cases are excessively rare, and cannot be detected beforehand. But remember that there are such cases, and do not be uncharitable in your remarks if you hear of a case of ruptured uterus in some one else's practice.

The **symptoms of rupture of the uterus** are sudden cessation of labour pains, with the equally sudden onset of symptoms of extreme prostration, pallor, whiteness of the lips, smallness and rapidity of the pulse, and hæmorrhage. On examination, the presenting part will be found to be no

longer pressed down as it was before ; it has wholly or partly receded into the womb. Sometimes a sudden pain, different from that of labour, is felt at the time of rupture ; and sometimes there is vomiting. The bleeding comes from the torn wall of the uterus. Part of it escapes outside, and can be seen ; part flows into the peritoneal cavity. If after rupture has taken place you examine the belly, you will feel the child in one place, and be able to identify its parts much more easily than in any case of pregnancy (because there is not the thickness of the walls both of the uterus and abdomen between your hands and the child, but only that of the wall of the belly), and in another place you will feel the contracted uterus.

Incomplete rupture.—In some cases the rupture is incomplete. The muscular wall of the uterus is torn through, but the peritoneum instead of being torn through is lifted up and stripped off the womb and the adjoining parts, so that the child does not get into the peritoneal cavity. In these cases the symptoms which the patient feels are the same, but when you examine, you will find that the child has not completely receded ; and when you examine the belly, you will not be able to feel the outline of the child so well as in a case of complete rupture, and it will not be so movable as after complete rupture.

Rupture of the uterus is a very dangerous occurrence. Of the mothers, five out of six die ; and of the children, about eleven out of twelve.

If you think that rupture of the uterus has taken place, you should send for aid at once. But it is much more important to know when rupture is likely to take place, and send for assistance in time to prevent it. It is not creditable if uterine rupture takes place in a case which you are attending.

Tonic contraction of the uterus is distinguished from uterine inertia by noting

the following points: On examination of the abdomen, in uterine inertia the uterus is not at all tender: it is lax; the outline of the fœtus can be felt, and the fœtus can be easily moved about. In tonic contraction of the uterus, the uterus is tender to the touch: it is hard and firm, and tightly moulded to the shape of the fœtus, which cannot be moved about. By vaginal examination in uterine inertia, the presenting part of the child can be pushed up, and moved about above the brim; while in tonic contraction of the uterus it is fixed in the pelvis, or above the brim. In uterine inertia the patient (unless there be some other complication present) shows no sign of great suffering or weakness; her temperature is normal, and her pulse not over 100. In tonic contraction of the uterus the expression of the patient's face shows anxiety and exhaustion; her temperature may be raised, and her pulse is quick, small, and weak.

Relative weakness of the pains is distinguished from uterine inertia by the fact that the pains are regular, frequent, and apparently powerful. It is distinguished **from tonic contraction** of the uterus by the fact that between the pains there are intermissions, during which the uterus becomes quite soft. But it is often very difficult to judge how far delay in labour is due to weakness of the pains, and how far to mechanical obstruction. Therefore in any case of lingering labour in which you have the slightest doubt as to the cause, you should send for assistance.

There is a rare form of lingering labour which is due to **premature retraction of the uterus**. This occurs chiefly in first labours, and in young women of nervous temperament. The pains occur as often as usual, and each lasts as long as usual; and they cause more suffering than usual (because

the patients are so sensitive), but they are inefficient. The upper part of the womb contracts, becomes smaller, harder, and its wall thicker; and the lower segment stretches, becomes elongated and thinned, just as in a case of obstructed labour. But *there is no obstruction*. During the pains the child is only forced very feebly against the soft parts, and during the intervals between the pains it is quite movable. If the child is pulled upon with forceps, the head presenting, or by the foot if the breech present, it is delivered with ease. After the child is born the placenta is expelled quickly and naturally, and there is no hæmorrhage. On abdominal examination in such cases the retraction ring can be felt, marking the limit between the part which retracts and the part which stretches; and as the labour goes on, this ring rises higher and higher, till it gets near the umbilicus.

This form of delayed labour is distinguished from uterine inertia by the regular and frequent occurrence of severe pains; and from obstructed labour by the child remaining quite movable, and not being the least impacted.

It is rare, and for that reason may be difficult of diagnosis. Therefore, if you suspect it, send at once for assistance.

CHAPTER VIII.

TRANSVERSE PRESENTATIONS.

CASES in which the child presents otherwise than with the head or breech, are grouped together under the



Fig. 61.—Transverse Presentation : Dorso-posterior.

name of *transverse presentations* or *cross births*. If the child remains in this position the shoulder is forced down.

Transverse positions.—Transverse presentations are divided into *dorso-anterior* and *dorso-posterior*, according to whether the back of the child looks forwards or backwards (Fig. 61). It is most common for its back to be turned forwards (Fig. 62).

These positions are again divided according to whether the head is towards the right or the left. The differences in position are quite unimportant from the point of view of treatment.

The term "transverse presentation" may make the beginner think that the largest measurement of



Fig. 62.—Transverse Presentation : Dorso-anterior

the child lies across the womb, the breech to one side, the head to the other. As a rule, however, the child's spine is so bent sideways, that although the shoulder is in the pelvic brim, and the head in the iliac fossa, the lower part of the body is nearly in the same position as if the head were presenting, so that on looking at the belly, the shape of the womb does not seem different from that which it has when the presentation is a normal one. For this reason, some prefer to speak of these cases as oblique presentations.

When the foetus lies transversely, it cannot, as a rule, be born without assistance. If the pelvis be not

larger than usual, the child not smaller than the average, and the power of the uterus not greater than ordinary, the child will not be born.

Modes of natural delivery.—There are four ways in which such cases may terminate favourably without help. By the first, the wrong position is spontaneously corrected. Early in labour the uterus, in contracting, tends to assume its own proper shape, and thus presses the head of the child, which is bulging out the lower segment of the uterus towards the middle line. It may succeed in getting it into the pelvic brim, and if it can do this the shoulder will be raised out of it. This is called *spontaneous rectification*.

By the second process, which, when it happens, usually occurs later in labour, the uterine contractions *turn* the child and bring the breech into the pelvic inlet, instead of the shoulder. This is called *spontaneous version*.

Each of these events is rare. We cannot tell when the malpresentation is going to be corrected in this way. Therefore we cannot at all expect that a case will be set right in one of these ways, but must act as if there were no such thing as spontaneous rectification or version.

The third way is called *spontaneous evolution*, or, at greater length, the *spontaneous evolution of Douglas*, after Dr. John C. Douglas, of Dublin, who was the first person who described it. I shall describe how it takes place nearly in Dr. Douglas's own words. The shoulder of the child is forced very low into the pelvis. The shoulder and thorax are at each successive pain forced still lower, until the ribs press on the perineum, and cause it to assume the same form as it would by the pressure of the forehead in a natural labour (Fig. 63). At this period not only the entire arm, but the shoulder, can be perceived externally, with the collar-bone lying under

the arch of the pubes. By further uterine contractions the ribs are forced more forward, appearing at the orifice of the vulva, as the vertex would in a natural labour, the clavicle having been by degrees forced round on the anterior part of the pubes. The entire fœtus, immediately prior to its expulsion,

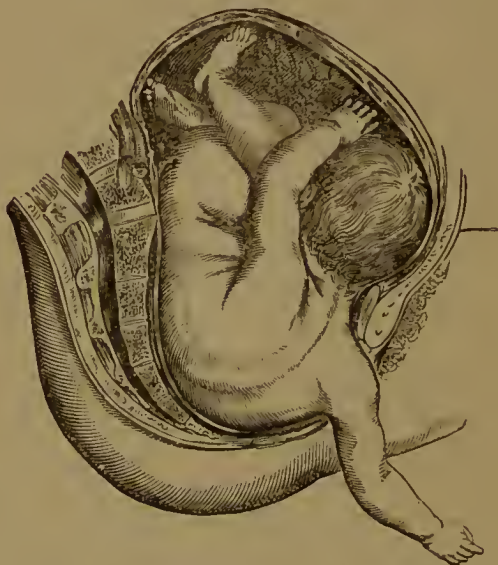


Fig. 63.—Spontaneous Evolution : its Commencement.

somewhat resembles the larger segment of a circle; the head rests on the pubes internally, the collar-bone presses against the pubes externally. The arm and shoulder are entirely protruded, with one side of the thorax not only appearing at the vulval orifice, but partly beyond it; the lower part of the same side of the trunk presses on the perineum, with the breech either in the hollow of the sacrum or at the brim of the pelvis, ready to descend into it. By a few further uterine efforts, the remainder of the trunk, with the lower extremities, is expelled. Delivery is finished

as in a labour in which the breech had presented (Figs. 64 and 65).

This mode of delivery requires very powerful uterine action to accomplish it. If only the uterus is strong enough, a full-time child may be delivered through a pelvis of average size in this way, and may survive. Delivery in this way, if it is going to take place at all,



Fig. 64.—Spontaneous Evolution in Progress.

will do so quickly. In the cases seen by Dr. Douglas, the labour was in each case over in less than six hours. But it is very seldom that the uterus is strong enough to drive the child out in this way, and therefore we must not expect or wait for this to happen.

The fourth way is called *spontaneous expulsion*. In it the child is driven through the pelvis doubled up, so that its chest and belly come out first, and then its head and legs (Fig. 66). This only happens with dead children, whose bodies are by decomposition rendered softer than natural, so that they can double up more easily.

Dead children are often premature. If the child be premature, small, and dead, delivery in this fashion can happen easily.

Management of transverse presentations.—When you have ascertained that the presentation is transverse, send for assistance. The child will



Fig. 65.—Spontaneous Evolution : its Termination.

have to be turned. Turning is sometimes a difficult operation, and an unskilful attempt at turning in a difficult case may do much harm. But there are certain circumstances in which you may interfere. If you can recognise early in the labour, before the membranes are ruptured, and before the shoulder is pressed down into the pelvis, that the head is lying in one iliac fossa, try, with the hands applied to the abdomen,

to push the head into the brim of the pelvis. The patient being on her back, put one hand on the outer side of the head, and the other on the opposite

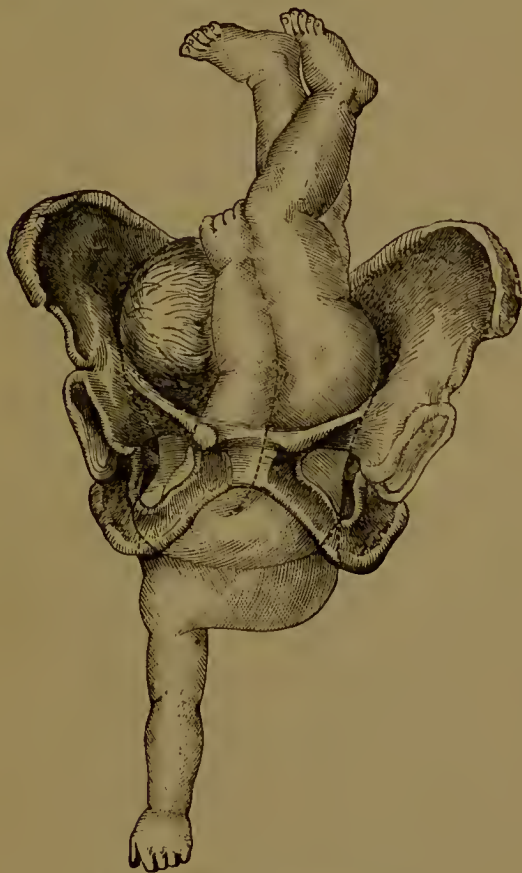


Fig. 66.—Spontaneous Expulsion.

side of the child's breech. Then press the head and the breech gently, but firmly, towards the middle line. If you cannot easily do this, send for help.

CHAPTER IX.

DESCENT, ETC., OF THE CORD—DESCENT OF THE HAND.

Descent of the cord means that the cord comes down by the side of the presenting part. Cases are divided into three classes: *presentation* of the cord (sometimes called *chorda prævia*), when it presents at the os uteri before the beginning of labour; *prolapse* of the cord, which signifies that the cord falls downwards when the bag of membranes ruptures; and *expression* of the cord, which means that the cord is squeezed out by the side of the presenting part later in the process of labour. In the first two classes the cord can often be returned, but in cases of *expression* of the cord, if it be put back it will be squeezed out again directly.

When and why important.—Descent of the cord is a matter of no consequence to the life of the mother, but it is a very dangerous thing for the life of the child, because it leads to the cord being compressed between the child's head and the pelvis (Fig. 67). When the child is born with the pelvic end first, the cord is always compressed for a little while between the head and the pelvis; but then the soft parts have been dilated by the body of the child, so that the head is quickly born, and in an ordinary case the cord is not compressed for more than a very few minutes. But if the head presents, and the cord comes down by its side, the cord is compressed during the whole time that the soft parts are being dilated by the head, which may take several hours, and in such a case the child is pretty sure to be dead. If the breech presents there is plenty of room for the cord to lie in while the soft parts are being dilated, so that it is not pressed

on till the head comes through. Therefore prolapse of the cord is a practically unimportant condition in cases in which the head does not present.

How produced.—Both prolapse and expression of the cord are prevented in normal labours by the

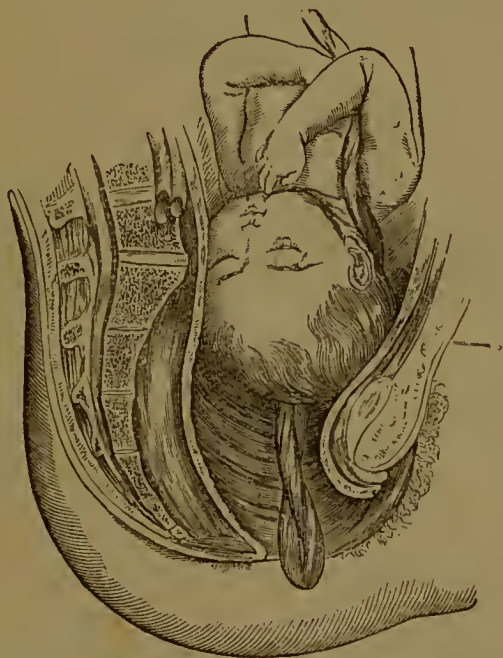


Fig. 67.—Prolapse of Cord with Head Presentation.

accuracy with which the head fills up the os uteri as it descends into the pelvis, so that the cord cannot get past it. Conditions that prevent the head coming down and filling the os uteri favour prolapse of the cord. *Contracted pelvis* is one of these. Remember this, and if you find the cord down, examine carefully the size of the pelvis. Excessive size of the child's head, as from water on the brain, is another cause which acts in the same way. In transverse

and breech presentations the presenting part does not so nicely fill the os as the head does, and therefore prolapse of the cord is more common with these than with head presentations (Fig. 68). When the cord is a great deal longer than usual, it is liable to fall down

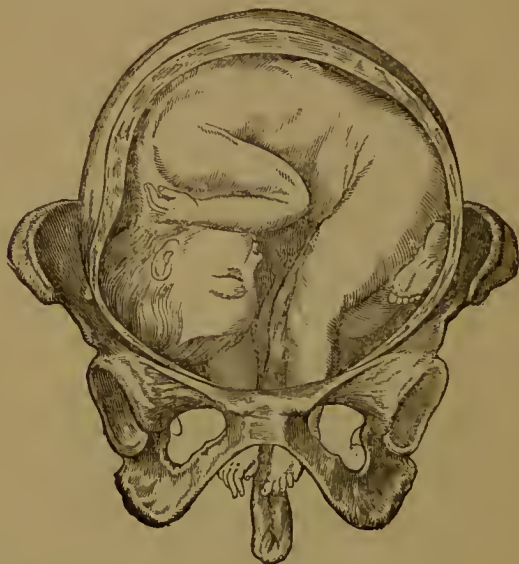


Fig. 68.—Prolapse of Cord with Hand and Foot presenting.

when the membranes rupture. If there is a great quantity of amniotic fluid, the rush of fluid when the bag bursts is apt to carry down the cord. If the placenta is implanted low down in the uterus, or if the cord, instead of being implanted near the middle of the placenta, joins it at its lower edge, then it more easily falls down through the os than if it were attached higher up. It is commoner in women who have had many children than in those pregnant for the first time.

Management.—Descent of the cord, so long as the membranes are unruptured, does not put the child

in danger, because the bag of waters protects the cord from injurious pressure. Therefore it is very important in these cases to keep the membranes unruptured as long as possible.

The treatment of presentation of the cord *before rupture of the membranes* is very simple. It is to put the patient on her knees and elbows (Fig. 69). In



Fig. 69.—Postural treatment of Prolapse of Cord.

this position the uterus is nearly vertical, the os uteri being the highest part, the fundus the lowest. Therefore the cord, which can move easily in the bag of waters, sinks down to the fundus of the uterus. The patient should be kept in this position for fifteen or twenty minutes, to give the cord time to sink to the fundus. Then she should lie on the side opposite to that on which the cord came down, in the hope that as uterine contractions drive the child's head down upon the cervix, the head will so fill it as to leave no room for the cord to come down again. She should be kept recumbent, and told to avoid straining, so as

to postpone rupture of the membranes as long as possible. Should the cord come down again, the patient must be again put on her knees and elbows. This is a method of treatment that cannot possibly do any harm.

After the membranes have ruptured this simple mode of treatment is not enough, although it may still be helpful. It may be sufficient if employed soon after the rupture of the membranes, before all the amniotic fluid has escaped. But if it be found that on putting the patient on her knees and elbows the cord does not go back, then it will be necessary, for the sake of the child's life, either to replace the cord or to quickly deliver the child. You will therefore do well to send for assistance. You may, if the patient will let you, and aid is not at hand, try to replace the cord with your hand; but as this cannot be done without putting the whole hand in the vagina, the patient will not readily let you attempt it. To replace the cord, put the patient on her knees and elbows, put the thumb and four fingers of the right hand together so as to form a cone, pass the whole hand into the vagina, then take the cord between the tips of the fore and middle fingers, or, if a large loop be down, in the palm of the hand, and *between the pains* carry it up *past the largest measurement of the head*. It is not the least use merely to push the cord up a little way, or to push up a part of it; the whole of it must be carried beyond the largest measurement of the head. If, when this has been effectively done, the cord again comes down, it is no use trying again; the only chance for the child is in speedy delivery. Leave it for some one of more knowledge and experience to decide how to do this.

Various instruments have been devised for replacing the cord. One can be made out of a catheter. Pass the ends of a bit of string in at the eye and out

at the end of a catheter, so as to leave a loop projecting at the eye. If you are not dexterous enough to do this, cut a hole in the catheter opposite the eye, and pass a loop of tape through the two openings; or get a piece of whalebone, and make a hole in it either with a pocket-knife or with a gimlet or bradawl, and thread the two ends of a piece of tape through the hole, thus leaving a loop. In either of these ways you will have a solid rod, with a loop at the end. The prolapsed piece of cord may be snared in the loop, and then carried up by the rod to the top of the womb. The noose should then be loosened, so as to let go the cord, and the rod withdrawn. But this is not so good a way as replacement by the hand.

You must not forget that contracted pelvis is one of the principal causes of prolapse of the funis. In a case in which the cord is down, examine the size of the pelvis, and if it be contracted, send for aid, whether the cord will go back or not.

Shortness of the cord.—The cord varies very much in length, and it may be so short as to delay delivery, and to risk inversion of the uterus occurring after delivery. Inversion of the uterus will be described in a subsequent chapter. It is more common for the cord to be made practically short by being twisted round the child's body or neck. Coiling of the cord round the body is not of much importance, as the child can either slip through the coils, or, as the body is being delivered, can turn so as to undo the twisting. Coiling of the cord round the neck is more important. If the cord be so short that it is tight, it may hinder the delivery of the shoulders, and even strangle the child. It is rare for it to be so tight as this. It is quite common to get one or two turns of the cord round the child's neck. Therefore you should always, when the head has been born, feel if there be a loop of cord round the neck. If there be, and the

loop is not tight, pull it until it is so far enlarged that the shoulders can slip through it, or even that the cord can be passed over the head. If it be so tight that you cannot make it wide enough to let the child's body pass through it, there is nothing for it but to carefully cut the cord, and grasp and tie the end as quickly as possible after the body has emerged.

Prolapse of the hand.—The hand may come down in a transverse presentation or in a breech presentation ; but in neither of these cases does descent of the hand make any difference in their management.

When the hand comes down by the side of the head, it may prevent the head from entering the brim properly. The causes which lead to prolapse of the hand are the same as those which lead to prolapse of the cord, and to abnormal presentations of all kinds, among them being contraction of the pelvis.

If, then, you find that the head is high up, not having entered the brim, and the hand is prolapsed by its side, remember that this may possibly be caused by contraction of the pelvis, and try to ascertain the size of the pelvis. If you find the pelvis contracted send for aid. If the head is entering the pelvis, and the arm is only slightly down, so that only the fingers can be felt by the side of the head, it is likely that as labour goes on the head will advance before the arm, and the labour will be ended naturally. If the child be not of undue size, and the pelvis not contracted, it is quite possible for the head and arm to come through the pelvis together. But if the head does not advance, put the patient on the side opposite to that on which the arm has come down, and send for assistance.

CHAPTER X.

TWINS.

Labour with twins.—In pregnancy with *twins* the uterus is larger than when it contains only one child (Fig. 70). Its wall is stretched and thinned, and



Fig. 70.—Twin Pregnancy. (From Galabin.)

therefore weakened. Hence the uterine contractions are often weak, and labour is slow. It is common also for one or even both of the twins to occupy an

abnormal position, and this may delay delivery. One twin may obstruct the birth of the other. The weakness of the uterus may persist after delivery, and cause post-partum hæmorrhage. Therefore in any case of twins you must *be specially on your guard against post-partum hæmorrhage*. If there be delay or difficulty in the birth of either child, you should send for aid.

Twins may each have a separate placenta and membranes, or they may have the same chorion and their placentæ may be united. When the twins are entirely separate, they may differ slightly in age: one twin may be even as much as three months older than its fellow, although this is not common.

The following are the rules according to which labour should be managed when one child has been born, and there remains another in the womb.

1. If, after the first child is born, the *membranes of the second child still remain entire*, wait for half-an-hour. If within that time *the placenta of the first child is expelled*, do not in any way accelerate the birth of the second. Wait another hour, and then, if no uterine action takes place, and there is no hæmorrhage, leave the patient, and tell her to send when the pains return. The second child may be retained for days, or even weeks. Such cases are rare.

2. If, half-an-hour after the birth of the first child, its placenta has *not* been expelled into the vagina, and the membranes of the second child are still unbroken, ascertain how the second child is presenting, and, if the head or breech be over the os uteri, rupture the membranes. If any other part present, send for assistance.

3. If the membranes of the second child have already broken, its delivery must be managed just as the delivery of any other child, only with more careful and prolonged attention to the prevention of post-partum hæmorrhage.

CHAPTER XI.

CONTRACTED PELVIS.

THERE are many kinds of **pelvic deformity** which contract the space through which the child has to pass, and so make labour difficult. The most common kind of contracted pelvis is what is called the **flat pelvis**. In this form the pelvic inlet is flattened from before backwards by an unusual projection of the sacral promontory. The worst kinds of this deformity are produced by *rickets*: a disease which occurs in infancy, and leads to softening of the bones so that they bend. In this disease other bones are affected besides those of the pelvis, and often therefore the legs are crooked and the patient is pigeon-breasted. But in many cases of flat pelvis there is no deformity of the limbs, and there are other causes of deformity of the chest besides rickets, so that you must not always draw conclusions as to the shape of the pelvis from that of the chest and limbs.

The conjugate diameter of a well-shaped pelvis measures from four inches to four and a half. If it only measure three inches and three-quarters, a child of not more than average size can pass without much difficulty. If the conjugate be less than this there will be difficulty, and if it be under three inches and a quarter a full time child is not likely to pass without help. In the slighter cases of flat pelvis the pelvis is only narrowed in its measurement from before backwards, being of normal size in other directions. In the worst cases the other diameters are shortened as well.

A well-informed accoucheur will suspect the existence of flatness of the pelvis from its *effect on labour*.

and ascertain it with certainty by *measurement of the pelvis*.

Mechanism of labour with flat pelvis.

—Great contraction of the pelvis prevents the head from entering the pelvis at all. The slighter forms only allow it to enter in a peculiar way. (1) The projection of the sacral promontory prevents there being room for the head in the oblique diameter of the

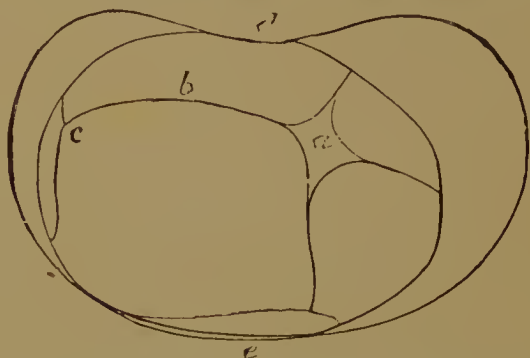


Fig. 71.—The Obliquity of Naegelé. (From Galubin.)

a, Anterior fontanelle; b, sagittal suture; c, posterior fontanelle; d, sacral promontory; e, symphysis pubis.

pelvis. Therefore the head lies *transversely* instead of in the oblique diameter of the pelvis, as in a natural case. (2) The largest transverse measurement of the head is the bi-parietal, which is behind the joint which the head forms with the spine. Hence, if the pelvis is not quite large enough to let the head enter easily, the hinder part meets with the most difficulty, and the front part of the head is forced lower down than usual. Therefore, *the anterior fontanelle* can be easily felt, and *is on the same level as the posterior*: not higher up than the posterior, as in normal labour. (3) The measurement between the two parietal eminences is greater than the *sub-parietal-super-parietal* measurement, that which is taken from a point below

one parietal eminence to a point above the other. The projection of the sacral promontory hinders the parietal bone that meets it from coming down. Hence the head gets so tilted that the sub-parietal-super-parietal measurement engages in the brim. When this tilting has taken place, the *sagittal suture* is felt running from side to side across the pelvis, very *close to the sacral promontory*. This tilting is called the **obliquity of Naegelé** (Fig. 71).

When these peculiarities exist together, the obliquity of Naegelé, a transverse position of the head, and a low position of the anterior fontanelle, it may be inferred that the pelvis is flattened, and you should try to measure it.

Other peculiarities in labour produced by flat pelvis are face presentations, prolapse of the funis, descent of the hand by the side of the head. When you meet with one of these conditions you should measure the pelvis. After a labour complicated with any circumstance that leads to suspicion that the pelvis is flattened, even though delivery have taken place without help, you should measure the pelvis, that advice may be given in any future pregnancy.

There is another kind of contracted pelvis in which the pelvis is not much altered in shape, but is smaller than it should be in all its dimensions. This is called the **generally contracted pelvis**. It is more difficult to detect this kind of pelvic deformity than that due to simple flattening. You will only be able to find it out by the delay in delivery which it causes. If the child be small, it will pass easily through a generally contracted pelvis. If the child be of average size, and the pelvis generally contracted, the difficulty in delivery will be just the same in kind as if the child were of excessive size and the pelvis perfectly normal.

In the flat pelvis all the difficulty is at the brim.

When once the head has got through the brim, delivery quickly takes place. In the generally contracted pelvis, on the other hand, there is difficulty all through.

There is another form of contracted pelvis which is not very uncommon. It is called the **kyphotic pelvis**, and is that met with in hump-backed women. A hump in the back is usually due to disease of the bones of the spine. This disease in a woman who is bearing children is generally past and gone, leaving only the deformity behind it; for a woman in whom the disease is progressing is not likely to become pregnant. The effect of this disease upon the pelvis depends upon its seat. The higher up it is, the less it affects the pelvis. If it be low down, the pelvis may be deformed. The deformity consists in enlargement of the brim from before backwards, with narrowing of the outlet, the ischial tuberosities being closer together than they should be. Hence there is no particular difficulty in the early part of labour, but great difficulty when the head gets low down in the pelvis. In these cases the head is very apt to present with the occiput behind, because the projection of the spine, to which the front of the child's body usually adapts itself, is absent. You can soon identify this deformity, because the tuberosities of the ischium can easily be felt. They ought to be at their hinder part four inches apart. If they are only three inches or less apart there will be difficulty.

Pelvimetry. — There are two ways in which you can measure the size of the conjugate diameter of the brim. The first is the *indirect* way. This can be done during labour until the head has passed the brim. It consists in measuring the **diagonal conjugate**. Put the fore and middle fingers of the left hand into the vagina (the forefinger alone cannot usually reach far enough), and press them up until you can feel the sacral promontory. Take care that

your finger is on the promontory, and not merely on the front of the sacrum below the promontory; and that it is on the middle of the promontory. Then, keeping the middle finger on the promontory, press



Fig. 72.—Mode of Measuring the Diagonal Conjugate.

the side of the forefinger against the lower edge of the symphysis. Then place the forefinger nail of the right hand where the examining hand is touching the lower border of the symphysis (Fig. 72). Then remove the two hands together without separating them, so that the finger-nail may accurately mark where the hand was

in contact with the symphysis. Now get some one to measure with a graduated tape or foot-rule the distance between the tip of the middle finger and the place where the side of the hand touched the lower edge of the symphysis. This distance is the *diagonal conjugate*, and it usually measures about



Fig. 73.—Pelvimetry : Measurement four inches.

half-an-inch more than the true conjugate. By deducting, therefore, half-an-inch, you will come very near to a correct measurement of the true conjugate. If, when you have pushed the fingers up as far as you possibly can, you still cannot feel the promontory of the sacrum, the probability is that the conjugate diameter is not contracted, and it certainly is not much contracted. This mode of estimating the conjugate diameter of the brim does not in all cases give a perfectly accurate result. But it gives a result very

near the truth, and it is nearest to the truth in the slighter degrees of deformity.

After delivery the conjugate can be measured **directly**, and exactly, by *Johnson's method*.* This method can be used before delivery in cases of great deformity, but not in slight cases.

To measure in this way you should be acquainted



Fig. 74.—Pelvimetry : Measurement three inches and a half.

with the measurements of your own hand. The following measurements, which Mr. Johnson gives, are those of a man's hand of average size. Measure your own hand, and see if and how much the measurements differ from those given.

1. The fingers being bent into the palm, and the thumb extended and applied close to the middle joint of the forefinger, the distance between the end of the

* So called after Mr. Robert Wallace Johnson, who first described it in "A System of Midwifery." London, 1769.

thumb and the outside of the middle joint of the little finger is four inches (Fig. 73).

2. In the above position, the distance from the thumb at the root of the nail, in a straight line to



Fig. 75.—Pelvimetry : Measurement three inches and a quarter.

the outside of the middle joint of the little finger, is three inches and a half (Fig. 74).

3. The fingers being in the same position, and the thumb laid obliquely along the joints next the nails of the first two fingers, and bent down upon them, the distance between the outside of the middle joint of the forefinger and the outside of that of the little finger is three inches and a quarter (Fig. 75).

4. The hand being opened, and the fingers held straight, the whole breadth from the middle joint of

the forefinger to the last joint of the little finger is three inches (Fig. 76).

5. The fingers being so far bent as to bring their tips to a straight line, their whole breadth across the joint next to the nails is two inches and a half (Fig. 77).

If the measurement be below two inches and a half,



Fig. 76.—Pelvimetry : Measurement three inches.

it is immaterial, so far as the student or midwife is concerned, how much less it is.

You should usually make this measurement either during or immediately after the third stage of labour. Make it during the first stage of labour if the head has not entered the brim. Put your fingers together into a cone, and put the whole hand into the vagina and up to the pelvic brim. Then put your hand, in

the different positions described, in the conjugate diameter, and see which measurement fills that diameter. Be quite certain that the part of the hand by which you are taking the measurement is in the narrowest part of the brim.

Other measurements at the brim besides the conjugate may be taken in this way if the pelvis be



Fig. 77.—Pelvimetry : Measurement two inches and a half.

contracted enough; but cases in which the other measurements are so small that they can be thus measured are very rare.

In the *kyphotic pelvis* the *transverse measurement at the outlet*—viz. that between the hinder parts of the tubera ischii—is important. This may be taken by Johnson's method, but it is not quite easy to do so, on account of the thickness and resistance of the soft parts over and between the bones. The best way of taking

this measurement is to make the patient kneel upon her knees and elbows, and then feel for the bones, and with an aniline pencil mark on the skin of the buttocks the outline of the bones beneath. When you have made marks accurately corresponding to the bones, you can measure the distance between the important points.

External measurements of the pelvis and other internal measurements than those given above may be taken ; but they are less important. There are also other forms of contracted pelvis, but they are so rare as to be comparatively unimportant.

CHAPTER XII.

HÆMORRHAGE.

Hæmorrhage is the greatest immediate danger that attends pregnancy and labour. No one ought to undertake to attend women in labour who does not thoroughly understand how to stop hæmorrhage from the womb.

Hæmorrhage may occur before delivery or after delivery.

HÆMORRHAGE BEFORE DELIVERY.

This may come from one of three causes. 1. Disease of the passages. 2. Injury of the passages. 3. Detachment of the placenta.

1. **From disease.**—There are diseases of the vagina and neck of the womb which may cause hæmorrhage during pregnancy. Hæmorrhage from this cause is seldom great, because disease of the womb of such a kind as to cause very profuse hæmorrhage usually prevents pregnancy from taking place. With the hæmorrhage and in the intervals between it, there are symptoms which generally make the patient go to a doctor. Hence you are not likely to be troubled much about hæmorrhage of this kind. But you should remember that hæmorrhage may be the result of disease.

2. **From injury.**—During pregnancy the blood-vessels of the genital organs are enormously increased in size. Hence if a pregnant woman near term receives a wound in the genital organs (as sometimes happens, for instance, from falling so that the genitals meet something sharp, or from sitting on a broken utensil), the bleeding is terrific, and often kills the

patient before a doctor can be fetched. The way to stop the bleeding is to lay the patient flat down and press hard on the bleeding point, pressing it against the nearest bone, and to send for assistance.

3. **From separation of placenta.** — The placenta should be implanted on the upper or middle part of the uterus. If so, the child ought to be born before the placenta is detached, and separation of the placenta before the birth of the child is an unfortunate accident, not a necessary event. Hence hæmorrhage before delivery, when the placenta is normally situated, is called **accidental hæmorrhage**.

The placenta may be implanted over the lower segment of the uterus: that is, over the part which has to expand and open up to let the child pass. This is called *placenta prævia* (from the Latin words, *præ*, before, *via*, the way): that is, placenta in the way of the child. When this is the case, the child cannot possibly be born without some of the placenta being detached and some hæmorrhage taking place. This form of hæmorrhage is therefore called **unavoidable hæmorrhage**.

ACCIDENTAL HÆMORRHAGE.

Causes.—We know very little about the causes of accidental hæmorrhage. Sometimes it is due to violence, such as a fall or a blow; sometimes it seems caused by some excitement, such as fright or anger; these causes probably act either by causing some irregular contraction of the uterus, or by exciting the circulation, leading in one of these ways to rupture of blood-vessels passing from the uterus to the placenta. Hæmorrhage of this kind is more common in women who have had many children than in those pregnant for the first time. It is believed that it is often due to disease of the womb itself, of the placenta, or of the blood-vessels, or to constitutional disease of the

mother. But we do not know enough about its causes to be able to do anything to prevent it, beyond keeping the mother as healthy and as quiet as possible ; and this is what ought to be done in the case of every pregnant woman.

Diagnosis.—Accidental hæmorrhage can only be distinguished from unavoidable hæmorrhage by vaginal examination after the os uteri is large enough to admit the finger. Then in accidental hæmorrhage the smooth membranes will be felt over the os ; in unavoidable hæmorrhage the rough spongy placenta will be felt. It used to be taught that in accidental hæmorrhage the blood flowed in the intervals of pain and stopped during the pains ; while in unavoidable hæmorrhage the pains brought on bleeding, which stopped during the intervals. This is quite true as to the time at which the blood escapes from the vessels, but it is not correct as to the time at which it flows out from the vagina ; for in accidental hæmorrhage blood may flow from the vessels in the intervals between pains, and be retained in the womb or in the vagina until a pain comes, which forces it out ; and in unavoidable hæmorrhage the blood may escape from the vessels during the pains and yet not all escape from the vagina, but go on flowing from the vagina after the pain has passed off. Hence this distinction is not of the least use in practice. Before the os is large enough to admit the finger, we cannot tell whether hæmorrhage is due to placenta prævia or to accidental separation of the placenta.

The danger of accidental hæmorrhage entirely depends upon its amount. If only a small quantity of blood is lost, it is a trifling complication. But in some cases the bleeding is profuse, and these cases are very dangerous. Judge of the danger, not only by the amount of blood which, from inspection of the napkins, clothes, utensils, etc., you can see has been

lost, but by the condition of the patient. Remember that a loss from which one patient can recover may be enough to kill another; and that you cannot be sure that the evidence of blood lost which you see accurately represents all that has been lost. If the patient be pale, her lips white, her pulse quick and small, she is in danger, whether the stains on her clothing be large or small.

Treatment. — Hæmorrhage before labour is stopped in exactly the same way as hæmorrhage after labour: first by pressure on the vessels, then by clotting of the blood in them. When the uterus contracts, its muscular fibres compress the vessels, as they do after labour. If the bleeding point should be opposite a hard part of the child, such as its head, and the womb is able to contract firmly about the child, this hard part will by its pressure on the bleeding point stop the bleeding. And if it can be stopped long enough for the blood in the vessels to clot, it will not return when the pressure is removed.

The treatment of accidental hæmorrhage, therefore, is to provoke uterine contraction, and the readiest way of doing this is to *rupture the membranes*. This brings with it certain disadvantages, which have been pointed out (page 27). Among these is that if the child be in a wrong position, turning is rendered more difficult. Therefore unless the hæmorrhage be so great as to put the patient in imminent danger, it is better to seek further advice before rupturing the membranes, and in the meantime give a hot vaginal douche. If the hæmorrhage be not very great, rupturing the membranes will usually provoke uterine action and stop the hæmorrhage. Its effect will be aided by putting a firm binder round the abdomen, so as to press on the uterus. But if the hæmorrhage be very great, the patient may be so exhausted that rupture of the membranes fails to provoke contraction of the uterus.

Such cases are among the most dangerous and most difficult cases that occur in midwifery. Therefore you should in any case of hæmorrhage lose no time in procuring assistance.

Concealed accidental hæmorrhage.—In some cases of separation of a normally situated placenta, the blood does not escape outside, but is pent up in the womb. The patient loses the blood just as much when it flows into the womb as when it escapes outside. The bleeding produces even a greater effect in prostrating the patient, for the blood distends and stretches the womb, causing the patient very severe pain.

This kind of bleeding is recognised by the following **symptoms** :—

1. There are the *signs of loss of blood*. The patient is blanched, her lips are pale, her pulse is small and quick, just as if she had lost much blood externally.

2. She has severe continuous *pain*, which she often says is of a tearing, stretching kind.

3. The uterus is large, rounded, very hard, and *very tense*, its tension not passing off as that of uterine contraction does.

If you are called to a patient presenting these symptoms, you should send for assistance without delay. The treatment is to rupture the membranes, and so relieve the distension of the womb and enable it to contract; and then to put on a binder. If the patient be very bad, and you are so situated that aid cannot be obtained quickly, you should do this at once. But if the patient be not so prostrate as to make delay dangerous, it is better (for the same reasons as in cases of hæmorrhage which is not concealed) to let your superior officer decide what is best to be done.

PLACENTA PRÆVIA.

Placenta prævia is present when any part of the placenta is implanted over the part of the uterus that has to dilate to let the child pass. This part is called the *lower segment of the uterus*, and, roughly speaking, extends about two inches from the os uteri. The placenta may cover the os uteri all round, and this is called *complete* placenta prævia (Fig. 78). It may only cover one side of the os; this is called *partial* placenta prævia. It may not cover the os at all, but a part of it may extend over the lower segment of the uterus, not reaching so far as the os; this is called *marginal* placenta prævia. Central placenta prævia is the most dangerous; marginal placenta prævia the least.

Symptoms.—In placenta prævia *hæmorrhage* before delivery is inevitable. The hæmorrhage begins when the os uteri internum begins to dilate. It may begin before this, because the placenta prævia may be detached by any of the causes that lead to detachment of a normally situated placenta; so that hæmorrhage in placenta prævia may begin at any period of pregnancy. There is reason to think that early miscarriage is sometimes due to placenta prævia. When hæmorrhage begins early in pregnancy, it is not usually so great as when it occurs for the first time near the end of pregnancy.

The **hæmorrhage** from placenta prævia is **produced**, as a rule, by the commencing dilatation of the internal os, by which the cavity of the cervix becomes part of the general uterine cavity. With this dilatation there is an onward movement of the lower end of the bag of membranes, which comes to lie over and press into the os externum. But if the lower end of the bag of membranes be formed by the placenta, which is attached round the os uteri internum, this

onward movement cannot take place without some detachment of the placenta. The detachment is not entirely due to the dilatation, because the placenta can stretch to some extent with the uterus ; it usually



Fig. 78.—Placenta prævia. (*From Galabin.*)

becomes detached first at one side, which permits the onward movement of the bag of membranes. Then as labour goes on another piece becomes detached, and the bag of membranes moves on a little more, and so on. Hence it is exceptional to meet with great hæmorrhage in placenta prævia without some dilatation of the os uteri.

Treatment.—If there is reason to believe that placenta prævia is the condition present, you should lose no time in seeking aid. The condition is so dangerous, and the result so much dependent upon proper and timely treatment, that you should not take upon yourself the responsibility of postponing resort to the best available help.

Delivery of placenta first. — Sir J. Y. Simpson recommended that the whole placenta should be detached, and delivered before the child. This cannot be done without forcing the hand into the uterus. All accoucheurs are now agreed that it is bad treatment. Sir James Simpson was induced to recommend it because in some cases the placenta is naturally expelled before the child, and such cases generally do well. Therefore he thought it would be a good plan to imitate nature in a course which was generally followed by happy results. But the reason why cases in which the placenta is born before the child generally do well is, that for this to happen there must be strong pains, and cases in which there are strong pains are the cases which do well; for the strong pains quickly force the child down on the bleeding part, and quickly close the bleeding vessels. But you must not trust to this. In any case of placenta prævia send for assistance as early as possible.

Plugging the vagina is sometimes recommended. For a hundred years or more, while some accoucheurs have advocated plugging the vagina, others have disapproved of it. As a means of checking hæmorrhage it is quite useless. If the bleeding goes on, the blood first collects above the plug, filling out the vagina and stretching it. The plug soon becomes saturated with blood, lies loose in the stretched vagina, and the blood flows past it. All that the plug does is to hinder for a little while the appearance of the blood outside. It

does not at all prevent the mother from losing it. It might perhaps be possible to stuff the vagina so tightly as actually to press effectively upon the bleeding points; but such plugging as this is very difficult to do, and cannot be done without hurting the patient very much, and leaving her in great pain when it is done; and even if you were able unassisted so to pack the vagina, you will seldom find a patient who will submit to its being done. Such plugging as you can do without help has not more than a very slight temporary effect upon hæmorrhage from the uterus. The presence of the plug in the vagina sometimes acts as a stimulant to the uterus and provokes pains. But it cannot be relied upon to do this.

Rupture of the membranes is in some cases good treatment. It acts in placenta prævia as it does in accidental hæmorrhage. If there are strong pains, the part of the child which is in advance is pressed down on the bleeding part, and stops the hæmorrhage. But if there are not strong pains the hæmorrhage is not stopped, and further treatment is rendered more difficult. Do not, therefore, take upon yourself to rupture the membranes without further advice.

Send for assistance at once.—If the hæmorrhage be very profuse you may plug the vagina with pocket handkerchiefs or diapers, first dipped in the 1 in 2,000 solution and then wrung out, as a temporary measure, and put a binder round the abdomen to press the uterus down on to the plug; but never trust to this, or let apparent success from this treatment induce you to postpone sending for assistance.

POST-PARTUM HÆMORRHAGE.

This means **hæmorrhage after the birth of the child.** It comprises both hæmorrhage occurring between the birth of the child and the delivery of the placenta and that occurring after the delivery

of the placenta. Hæmorrhage occurring more than twenty-four hours after the birth of the child is called *secondary* post-partum hæmorrhage.

It has been already mentioned that the third stage of labour is always accompanied with some slight hæmorrhage. The course of the case may be considered normal if the quantity of blood lost does not exceed a pound.

The great cause of excessive hæmorrhage after delivery is **uterine inertia**: that is, deficient contraction and retraction of the uterus. There are other causes which are rarer. These are: retention of a piece of placenta or membrane; laceration of the cervix so extensive as to open a large blood-vessel; inversion of the uterus; and "hourglass contraction" of the uterus. When the placenta is separated from the uterus, the large veins which returned the blood by which the placenta had obtained nourishment for the fœtus are laid open. If the uterus contracts and retracts as it ought to do, the veins are compressed by the muscular fibres of the uterus so that they cannot bleed. If contraction and retraction are imperfect, the placenta will be slowly separated, and the hæmorrhage attending and following its separation will be greater.

Adhesion of placenta.—Beginners often think that adhesion of the placenta is much commoner than it really is, both because they are apt to fail to distinguish between retention of placenta in the vagina, due to want of skill in the attendant in pressing it out, and retention in the uterus; and because, until they find out how rare adhesion is, they often take mere slow separation of the placenta for retention by adhesions. With increasing skill in pressing out the placenta, in recognising the diminution in size of the uterus which accompanies the expulsion of the placenta into the vagina, and increasing knowledge of the great difference between different cases of normal labour,

you will come to learn that adhesion of the placenta is a rare thing.

Adhesion of the placenta is caused by disease of the decidua, but we do not yet know enough about the diseases of the decidua which lead to adhesion of the placenta to be able to foretell or prevent such adhesion.

If the placenta should be everywhere adherent, of course no bleeding can take place, for then no vessel could be opened. But such cases are infinitely rare; usually the adhesion is only partial. In that case the part which is not united to the uterus with abnormal firmness becomes separated, while the part which is adherent remains attached and prevents the uterus from properly contracting and retracting, and so the vessels which have been opened by the detachment of the healthy part of the placenta bleed. If it be only a very small piece of the placenta that is adherent, the mass of the placenta may be torn off from it and expelled. In that case the little adherent bit of placenta in the womb will prevent persistent uterine retraction, and post-partum hæmorrhage will result. In this connection it must be mentioned that in rare instances there is a little bit of placenta attached separately from the main part. Such little detached islands of placenta are called *placentæ succenturiatæ*. One of these may be retained after the bulk of the placenta has been expelled, and may cause hæmorrhage. The retention of an adherent bit of placenta from which the main part has been broken off can be found out by examining the placenta, in which the gap left by the torn-off piece will be perceived; but examination of the placenta will not reveal the retention of a placenta succenturiata, for then there will be no gap in the main mass. But in the latter case a piece of *chorion* will be retained along with the island of placenta, and therefore if you examine the

membranes as well as the placenta you will be able to find out that there is a piece of membrane retained.

Retention of membrane even without a piece of placenta may cause post-partum hæmorrhage. Such retention is favoured, as has been shown, by too early rupture of the membranes, too late rupture of the membranes (page 26), too hasty squeezing out of the placenta (page 81).

Uterine inertia, or atony of the uterus.—

This is the great cause of post-partum hæmorrhage. In the worst cases the uterus instead of feeling like a hard ball feels like a loose, flabby bag. It may be so loose and shapeless that the hand on the abdomen cannot make it out at all. When the uterus is so relaxed as this, its muscular fibres do not compress the veins, and so bleeding goes on. The blood escapes into the cavity of the womb and distends it, thus making it more difficult for the enfeebled womb to contract. In such extreme cases as this, the woman, if not properly treated, may bleed to death in a few minutes. In any case in which the womb does not remain hard and firm after delivery there is need for constant watchfulness.

Uterine inertia in the third stage of labour is sometimes a continuation of uterine inertia in the first and second stages of labour: the uterus being weak throughout the whole process. But it is seldom that, if the uterus has been contracting regularly up to the birth of the child, even though the pains have not been forcible, hæmorrhage occurs. It is not so much weak pains as irregular pains in the second stage of labour that should make us expect hæmorrhage in the third stage. Emptying the uterus while contraction is not present is a very sure way of provoking dangerous post-partum hæmorrhage. If, while the uterus is in a state of inertia, pains being absent, the child is dragged away, this is one of the surest ways of

producing post-partum hæmorrhage. This is why, in breech presentations, you should be careful to pull only with the pains ; and why, in inertia delaying the birth of the head, in cranial presentations, you should not be in a hurry to ask someone to come and apply forceps, but rather let the patient have a sleep, and then, when the pains have returned, if they are not powerful enough, they may be helped by aid from without. In delivery, uterine contractions may be helped, not replaced, by pulling. There are certain conditions in which the uterus is apt to be weak from over-distension, and in them, because of this weakness, there is apt to be inertia in the third stage. Such are pregnancy with twins, or with dropsy of the amnion. After very prolonged labour, such as occurs with very big children, the uterus is likely to be exhausted, and to contract badly after delivery. Uterine inertia is also likely to happen if the mother has been enfeebled by hæmorrhage before the birth of the child. There are other rarer causes, such as the presence of tumours in the womb or of disease of the womb. There are also some women, known as "bleeders," who are more prone to lose blood than most people ; they bleed much from slight cuts, after having a tooth extracted, etc. ; and such women after delivery are very prone to hæmorrhage, and need the greatest care. The fault in them is that the blood does not clot, adhere to, and plug the vessels so readily as it ought to do.

Although the above-mentioned causes favour hæmorrhage, you must not think that because none of them appears to be present the patient will not have hæmorrhage. The occurrence of hæmorrhage cannot be foretold, nor can we be in any case sure that after delivery uterine contraction and retraction will be perfect.

Hæmorrhage from uterine inertia comes on within the first hour after delivery. It is profuse. If

you do not do your duty, but leave the uterus unwatched, hæmorrhage to a dangerous extent may take place before external bleeding is noticed, or symptoms arise which draw attention to the patient's condition. Hæmorrhage from inertia may take place either before or after the placenta is expelled. The treatment is the same in either case. If it takes place before the expulsion of the placenta, the treatment which stops the hæmorrhage will hasten the expulsion of the placenta.

Symptoms.—The bleeding may be *external* or *internal*. In the worst cases, in which the relaxation of the uterus is greatest, the blood does not escape outside in any quantity, but flows into the flabby uterus, filling it with blood, and filling also the vagina. This does not cause pain, and the only indication that this internal hæmorrhage is going on is the effect produced by loss of blood. The patient becomes pale: it may be literally said, "deathly pale." The pulse becomes quick, small, and feeble. The hands and feet and nose become cold. The patient breathes with irregular, sighing, hurried breaths. She looks anxious, groans, and sighs, and she becomes restless, throwing her limbs about. This restlessness is a very bad sign, and generally foretells death. There may be vomiting, and the patient may complain of noises in the ears or of a mist before her eyes, although generally she is too ill to mention such small troubles. These symptoms are present in greater or less degree according to the amount of blood lost: and the appearance of any of them should make you carefully examine the abdomen. If there be internal hæmorrhage, as soon as vigorous pressure is made on the abdomen, blood, mingled with large black soft clots, will pour from the vagina in quantity.

If you have conducted the third stage of labour in the manner that has been advised in chapter iv., you

will have recognised the relaxation of the uterus long before matters get to this pass, and will have applied proper treatment. *Send for aid*

Treatment.—In the *treatment of post-partum hæmorrhage* the first thing to be done is to put your hand on the abdomen, and if you cannot feel the uterus, to rub and knead the lower abdomen until uterine contraction is provoked, and *you feel the uterus* hardening under the hand. Then keep your hand on the uterus, to be sure that it remains contracted; and if it relaxes, the rubbing and kneading must be resumed.

This is the quickest way of provoking uterine contraction, and therefore the one which should always be preferred. Other ways are sometimes mentioned, such as putting cold cloths to the abdomen or vulva, that the shock caused by the cold may make the uterus contract. But the patient may lose a quantity of blood while the cold cloths are being got ready. There is no way of provoking uterine action so quick as kneading and rubbing the abdomen.

2 When you have got the uterus contracted, give the patient a teaspoonful of the liquid extract of ergot in some water. Be as quick as possible in getting this, so that the uterus may be left unwatched for as short a time as possible. If there be anyone else in the room, instruct her to rub and knead the belly while you are getting the medicine ready.

3 If you find that the uterus will not remain contracted, that the rubbing and kneading produce momentary contraction only, then you must, while keeping your right hand on the uterus, *pass your left hand* (first rinsed in sublimate solution) into the vagina, and then into the uterus. Do this because the hæmorrhage may be caused by a bit of retained placenta or membrane, or a clot may be hindering perfect uterine contraction. Having passed your

hand into the uterus, feel for any bit of placenta, or membrane, or clot, and clear out with your fingers everything that you find, so as to make sure that there is nothing retained in the womb. Having done this, withdraw your hand from the uterus into the vagina. Then with the right hand press on the back of the uterus through the abdominal wall, while

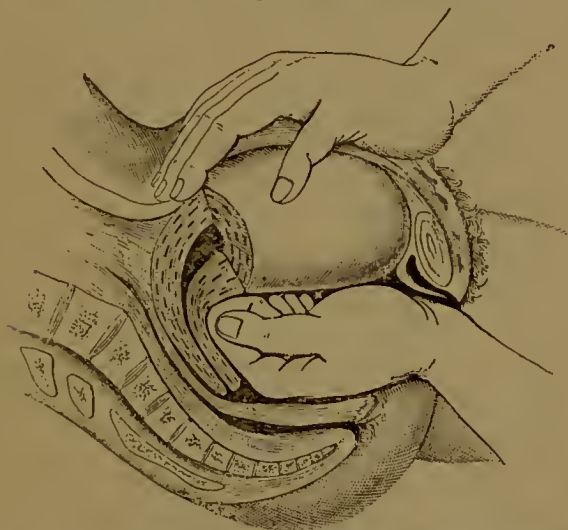


Fig. 79. —How to compress the Uterus to stop Post-partum Hæmorrhage.

with the hand in the vagina you press on the front of the uterus (Fig. 79). You can thus *seize the uterus between the two hands*, and *compress it* as firmly and as long as your strength will permit. While you are in this manner grasping the uterus and pressing its two walls together, it is scarcely possible for serious hæmorrhage from the inside of the uterus to take place. If the hæmorrhage has been great, you should, while you were doing what has been described, have sent for aid. If you have not yet done so, and find that if you leave off holding the uterus it at once relaxes,

you should send for assistance. While waiting for the arrival of help, hold the uterus between the hand in the vagina and the hand outside until assistance comes.

Hourglass contraction of the uterus means that the cervix is contracted, hindering the expulsion of the placenta. When this condition is present, steady draining of blood goes on from vessels (laid open by the separation of the placenta), which the uterus cannot close because the retained placenta hinders it from contracting. You will easily detect this by tracing up the cord, and feeling the tight ring of the contracted cervix encircling it.

The **treatment** is to dilate the cervix with the hand, made into a cone by putting together the thumb and tips of the fingers. While this is being done, grasp the body of the uterus with the other hand on the abdomen, and press it downwards and backwards: the object of such counter-pressure being (1) to push the cervix down within easier reach of the internal hand, and (2) to prevent tearing the uterus away from the vagina. But as this treatment is sometimes difficult, and these cases are dangerous, you should send for assistance without delay, and only attempt it yourself if the hæmorrhage is so great that delay will make death imminent.

Hæmorrhage may occur from **laceration** of the cervix or some other part of the genital canal. Lacerations short of rupture of the uterus or vagina seldom cause dangerous hæmorrhage. You will recognise this kind of hæmorrhage by noticing that it continues although the uterus is well contracted and retracted. If you find copious hæmorrhage going on which appears to you to be from this cause, send for assistance, and meanwhile examine the cervix and vagina with your fingers (and eyes, as far as possible), to see if any tear be present; and if you find one, press with

your fingers the margins of the tear against the nearest bony surface, and maintain the pressure until help comes.

Inversion of the uterus may be the cause of hæmorrhage after delivery. Fortunately it is very rare. It means that the uterus is turned inside out, so that what is naturally its inner surface becomes the outer, and occupies the vagina, with the cervix encircling its upper part. This occurs if, at a time when the uterus is quite relaxed, the body of the uterus is either (1) pulled down by the cord—either in the birth of the child from the cord being too short, or made too short by being coiled round the child—or afterwards, from the attendant trying to deliver the placenta by pulling at the cord; or (2) pushed down, as by some effort on the part of the patient; or by the medical attendant, if, to expel the placenta, he presses downwards on the fundus uteri when it is relaxed. If the body of the uterus is thus pushed or pulled down through the cervix, and then, when it is down, the cervix contracts, the body will be held down. In this way inversion of the uterus is produced and maintained.

The **symptoms** of inversion of the uterus are hæmorrhage, with great prostration. When you put your hand on the abdomen and feel for the body of the uterus, you cannot perceive it, however much you knead and rub the abdomen. Then you examine by the vagina, and find it filled with a fleshy tumour nearly as big as a child's head, and this tumour is encircled high up by the ring of the cervix. The placenta may be attached to this tumour, and if so, you can have no doubt what it is.

The **treatment** of inversion of the uterus is to push it back. This is easily done immediately after the inversion has occurred; but later on, when the cervix has become more persistently contracted, it is difficult.

Therefore, if you discover that the uterus is inverted, carefully try to replace it. Press the inverted body of the uterus with the thumb and tips of the fingers steadily, and with moderate force, upwards, making counter-pressure into the ring of the cervix with the finger-tips of the other hand over the lower abdomen. If this does not replace the inverted body of the uterus, send for assistance. If you do succeed in replacing it, use most carefully the measures recommended in the treatment of post-partum hæmorrhage to produce and maintain uterine contraction.

CHAPTER XIII.

OTHER COMPLICATIONS OF LABOUR.

A PREGNANT woman is not by her pregnancy protected from disease. A patient in labour may present symptoms not due to labour, but to illness accompanying it. If the pulse is over 100, take the temperature. If it be over 101, some acute disease is probably present. If the respirations are over 25 per minute, and the patient has a cough, there is probably some chest affection. If symptoms of this kind, or any other which cause alarm, and which you do not understand, be present, you should seek further advice.

The most important of the diseases which may accompany pregnancy, because the one to which pregnant women are especially liable, is **disease of the kidneys**. The symptoms of this disease are often slight and insidious in onset. The most common are swelling, which pits on pressure, not only of the legs (which is quite common in pregnancy), but of the arms and face; vomiting; weakness; shortness of breath; severe headache, and impairment of sight. If symptoms of this kind, even though slight, be present, the patient's urine should be examined.

In some cases of kidney disease—about one in three or four—**eclampsia** occurs. The patient has *epileptiform convulsions*: that is, fits like those of epilepsy—indeed, only distinguishable from epilepsy by the fact that the patient has never had fits before, and that when the urine is examined kidney disease is found to be present. You ascertain that the fits are epileptiform convulsions, and neither hysterical seizures, nor random movements of the limbs due simply to the patient being nervous and excited, by the fact that

consciousness is lost during the fit. Test this by opening the eyelids, and touching the white of the eye with a clean finger. If the patient be unconscious, this will not provoke closure of the lids; if she be conseious, it will.

In a case of this kind, send for assistance, and in

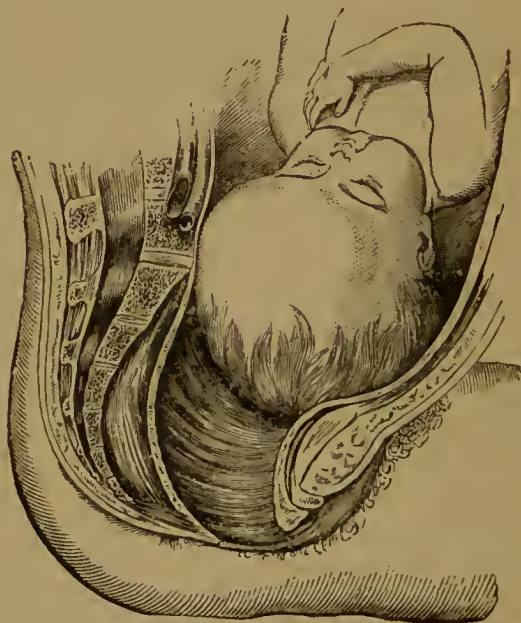


Fig. 80.—Hydrocephalus.

the meantime do all you can to prevent the patient from hurting herself during the fits. Put a spoon or a bit of firewood between her teeth, to prevent her from biting her tongue. Loosen all garments that can impede the movements of breathing. Save for examination as much of the urine as you can get; if possible, draw it off with the catheter, but do not persist in efforts to do this if they provoke struggling and excitement in the patient. Keep the patient on

her left side, lying as much over on her face as possible, so that the fluids may run out of her mouth, and not choke the air passages.

Deformity of the child.—The child may be malformed or diseased, so that its bulk is abnormally great, and hence there is difficulty in delivery, the cause of which, from its unusual character, may be very difficult to ascertain. The only disease of this kind that is at all easy to recognise is *hydrocephalus*, or water on the brain (Fig. 80). In this disease the head is much larger than it should be, and the bones are so separated by the pressure of the fluid within that the sutures and fontanelles are felt, on vaginal examination, as wide spaces between the bones. Although it is very difficult to ascertain before birth the nature of other malformations, yet if you make a point of always finding out early in labour, by abdominal examination, the position and size of the child, you will, when you make this examination, soon perceive that something is unusual, although you may not be clear what, and you will therefore have sought assistance early.

CHAPTER XIV.

HOW TO REVIVE STILL-BORN CHILDREN.

Still-birth.—After difficult labour, children are often born in a state of suspended animation: the child does not move or breathe, but its heart beats. If the child's heart has stopped beating, it is dead, and cannot be revived. It is easy enough at first to tell whether the heart is beating by feeling the cord, which pulsates at each beat of the heart. After the cord has been tied the beating of the heart can be felt by putting the hand over the left side of the chest, or heard by putting the ear to the left side of the chest. Before the heart ceases to beat it becomes irregular; hence, do not conclude that the child is dead merely because for a minute or two you are unable to feel or hear pulsations. If the skin is peeling off, there can be no doubt that the child is dead. Children who are born still, but not dead, are seen in two states—the *blue* and the *white*. In the former the skin of the child is of a mottled bluish colour, but its limbs are firm, not flabby and relaxed, and it can move its limbs. In the white state the skin is very pale and the limbs are flabby, and nothing that is done to them provokes movement. Children in the blue state are easily revived; children in the white state with great difficulty. Children, if not properly treated, may pass from blue asphyxia into white asphyxia.

Treatment.—To revive a still-born child, the first thing to be done is to wipe away from its mouth and nose all fluids that may prevent air from getting in. Put a handkerchief over its mouth and blow down it. This will blow the mucus out of its nostrils. Then lay it face downwards, taking care that its mouth is

free, press on the back of its chest so as to help fluid out of its mouth and windpipe, and rub down the spine. If this produces no effect, slap the buttocks and the inside of the thighs, and sprinkle the chest, face, and back with cold water. With children in blue asphyxia treatment of this kind will usually provoke movements of breathing. But slapping, etc., are no use in cases of white asphyxia, and do not always succeed in blue asphyxia. In that case you should perform artificial respiration in the following way :—Put the child on its back. Take hold of the arms just above the elbows, and carry them upwards and outwards, bringing them up to the sides of its head. Then carry them downwards and forwards to the sides of the chest, and press them gently, but firmly, against the sides of the chest. These movements should be so done that they take about two or three seconds ; they should be repeated from twenty to thirty times a minute. The upward and outward movement of the arms expands the chest and draws air into it ; the downward movement, and especially the pressure against the sides of the chest, contracts the chest and presses the air out. If the child is to be saved, the first sign of success will be that it will make a single spasmodic inspiration. After an interval there will come another, and these inspirations will recur at gradually shorter and shorter intervals until respiration becomes regular. As respiration becomes regular the heart's beat will become regular too, and quicker, and the colour of the skin will change from the blue or white colour that it had before to a healthy pink. After signs of life have appeared, the efforts at breathing may be stimulated by dipping the child in cold water, or alternately into hot and cold water. But if you do this, do not then discontinue artificial respiration, but persevere until the child breathes regularly.

CHAPTER XV.

THE LYING-IN PERIOD.

THE month following labour, during which the changes which had taken place in consequence of pregnancy are undone, and the parts restored nearly to the same state as before pregnancy, is called **the lying-in period**. The womb and vagina do not return exactly to the same state as before pregnancy; there is always some permanent difference produced by child-bearing. Besides the undoing of the pregnancy changes in the pelvic organs, there is the full establishment of a new function: that of **lactation**, or suckling.

Immediately at the close of labour it is very common for the patient to shiver. It at this time is not a sign of disease. It is followed by warmth and perspiration, and is not accompanied with fever. The patient naturally feels tired after the fatigue of labour, and after she has been made clean and comfortable will probably go to sleep. The **pulse** after delivery should sink to about 72 beats per minute, or even fewer. After the first twenty-four hours the pulse should sink still further: to 60 beats per minute, or under. It remains slow until the patient begins to get up. If the labour has been very long and exhausting, the pulse may be quicker than this, its quickness during the first few days being, as a rule, proportionate to the length of labour. If at first quick, it ought gradually to get slower. A quick pulse in the first three days is not by itself a proof that the patient is doing badly, but it should make you exceedingly careful.

The **temperature** of the lying-in woman ought

to be between 98° and 99° , and ought never to exceed 100° . This is the most trustworthy index of the patient's condition that we have. Take the temperature every time you visit the patient. The temperature may be taken either under the tongue or in the armpit. Before taking it, the index of the thermometer should be shaken down below 95° . In taking the temperature in the mouth, see that the bulb of the thermometer is placed well under the tongue and is kept there, and that the patient's lips are kept closed. If it be taken in the armpit, see that the arm is kept close to the side. Either make the patient lie on that side, or hold the arm close to the side with the other hand while the thermometer is in the armpit, and see that the bed-clothes are closely tucked in round the patient's neck. The thermometer should be left in two to five minutes. Three minutes is enough for practical purposes.

If the temperature is over 100° there is something wrong, although it may be only something trifling. If it be over 101° further advice should be asked for.

During the lying-in period the uterus goes on contracting, just as it did during labour. For the first few days these contractions are painful, and they are called **after-pains**. They are more severe and persist longer in women who have had many children. If you put your hand on the abdomen during one of these pains, you will feel the uterus harden during the pain. The use of these pains is to expel clots and discharge from the womb. They can be provoked by rubbing the belly, or by putting the child to the breast, or by the movements of the patient. Sometimes they are so severe as to make the patient sick, or keep her awake at night. In that case ten grains of antipyrin will relieve them. A mixture suitable for the purpose is provided for use in most maternity charities.

The discharge which escapes from the vagina during the ten or twelve days following delivery is called **the lochia**. At first this discharge is pure blood, and for three or four days it is mixed with blood, so that it is red or pink in colour. It gradually gets lighter in colour and less in quantity. It should not contain blood after the first week. After the first day its quantity should not be more than that at a tolerably copious monthly flow, and this should steadily diminish. If the loss is much more than this, there is need of treatment. If it contains blood after the first fortnight, further advice should be sought. It should never smell offensively, and if, in spite of syringing, it is offensive, ask for further advice. When patients are properly taken care of, and vaginal douches are used, the discharge usually ceases altogether within a fortnight after delivery, but when the douche is not used it often lasts longer. It is usually received in a napkin, like the ordinary monthly flow. It is better to use pads of absorbent cotton, or Gamgee tissue, or wood-wool for the purpose, which can be burnt as soon as soiled. But if the patient be very poor, you need not put her to additional expense on this account, for if they are clean, ordinary napkins will do. Wool or clean napkins should be used for cleansing the parts, and not sponges; for in ordinary practice it is almost impossible to be sure of the cleanliness of sponges.

Retention of urine sometimes occurs in the first few days of the lying-in period. There are two causes which usually combine to produce this: the urethra has been bruised during the passage of the child, and is in consequence swollen; the abdominal walls have been so stretched in the pregnancy that they are weakened, and the patient cannot strain to expel the urine. Therefore, a patient often cannot pass water while recumbent, but if she kneels up in

bed she can do so. It is a good thing for her occasionally to kneel up in bed, because it helps the escape of discharge from the vagina. Hence, if there be retention of urine this is the first thing you should advise. If even when kneeling the patient cannot pass water, let some very hot water be put in the utensil, so that the steam from it may warm and moisten the parts. This will often so relax the swollen parts that the patient will succeed in passing water. If this fails, and the patient is in pain, you must pass the catheter. But do not use the catheter merely because the patient has not passed water. If the quantity of urine retained is not enough to cause her distress, there is no urgent need for its being withdrawn.

To pass the catheter.—Place the patient on her back, with her knees drawn up. Cleanse the parts by gently wiping them with wool dipped in 1 in 2,000 sublimate solution. Take the catheter in the right hand, and hold it about two inches from the tip. (It is a good thing to put about three feet of indiarubber tubing over the open end of the catheter; the urine is then conveyed out of the bed into a utensil on the floor.) Stand on the patient's right side, and pass the right hand holding the catheter under the patient's right thigh. Pass the left forefinger over the abdomen between the labia into the vagina. Then draw it upwards exactly in the middle line until the pulp of the forefinger feels the orifice of the urethra. The meatus urinarius feels very like one of the small linen-covered buttons with which underclothing is often fastened: a little ring, with a slight depression in its centre. When you feel this, draw the finger upwards till it is just above the meatus, and then with the right hand pass the point of the catheter below the tip of the left forefinger into the urethra. If you cannot succeed in

thus quickly finding the meatus by the touch, it is better to look than to annoy the patient by prolonged attempts at passing the catheter by the touch alone.

Diet.—During the first two days of childbed a patient seldom has much appetite, and she should be limited to light food, such as is easily digested : gruel, beef-tea, bread and milk, etc. But as soon as appetite returns she may be allowed to eat and drink what she likes. It used to be the custom to half-starve lying-in women, under the idea that by restricting food inflammation and fever were prevented ; but we know now that diet has nothing to do with the development of these diseases in childbed. It is usual on the third morning after delivery to give an aperient. It is not of great importance what the aperient is ; and if the patient prefers any particular laxative, you may let her wish influence you.

Suckling.—As a rule the breasts do not alter much during the twenty-four hours following delivery. During the second and third day they get larger ; they feel harder and more knotted, from the swelling of the lobules which form the gland ; they are often painful, the pain spreading down the arm ; and they are tender. This healthy swelling, hardening, and tenderness affects both breasts, and the whole of each breast ; while the swelling and tenderness that are the beginning of an abscess affect part only of one breast. About the fourth day milk begins to be plentiful ; and when the child sucks and empties the breast, the swelling and tenderness are relieved. If the child does not suck, the milk overflows, and the swelling, pain, and tenderness gradually, though slowly, go away, the breasts then taking two or three weeks to return to their former state. This secretion of milk takes place after premature labour, and even after miscarriage if it be later than the fourth month.

Duration of milk secretion.—When the

child has begun to take the breast regularly, the secretion of milk continues. In strong women it may go on for years if the child is kept to the breast. In others it spontaneously ceases at the end of a few months, or it may be weeks, in spite of the mother's attempts to continue to nurse. Such early cessation of the lacteal secretion is probably an indication of weakness; but we do not know enough of the causes which bring it about to be able to predict, after a first labour, that the mother will or will not be able to nurse her child as long as she wishes.

Colostrum.—The secretion of the breasts during the day or so following delivery is called “colostrum.” It is slowly formed in the breasts during pregnancy. No sharp line can be drawn between colostrum and milk; the one gradually passes into the other. The colostrum is opalescent, containing drops and streaks of yellow fluid. Milk is paler in colour and uniform in appearance. Microscopically, the chief peculiarity of colostrum is that it contains “*colostrum corpuscles*.” These are epithelial cells stuffed full of fat. They seem mulberry-like masses of fat globules held together; but they are cells, for they have nuclei and possess amœboid movements by which they can expel fat globules. When the breast begins to secrete, the cells of its alveoli exhibit movements and take up fat globules, and then they get detached and become colostrum corpuscles. These bodies are found only while the secretion of milk is scanty; that is, soon after delivery and during weaning. When the mammary function is in full activity colostrum corpuscles are not found. Besides these bodies, colostrum contains some fat globules, free nuclei, and cells like colostrum corpuscles, except that they contain only a few fat globules and have plainly visible nuclei.

Chemically, colostrum differs from milk in containing very little casein, but more fat, more sugar,

more salts, and some serum albumin, which is precipitated by boiling. It is an old idea that colostrum has a purgative effect on the child, but there is no evidence of this. Children who are not suckled empty the bowel as soon as those who are.

Milk.—Human milk is a bluish white fluid with a specific gravity of 1028—1034. Microscopically, it seems to consist of fat globules floating in fluid. These globules are formed in the cells lining the alveoli of the breast. Part of the cell is separated, with the fat globules in it. When the secretion of milk is going on fast, few cells in the breast contain globules; but when the secretion is scanty, the cells are found stuffed with fat. Some believe that each globule of fat is surrounded by a membrane—the “haptogenic” membrane—the function of which is to prevent the globules from sticking together; but others think that the supposed membrane is only a pellicle of casein surrounding the fat.

Chemically, milk consists of about—water, 87 to 89 per cent.; solid matters, 11 to 13 per cent., composed as follows:—Casein, about 2·75; butter, about 3·5; milk-sugar, about 5; salts, about ·25.

The components of milk.—*Casein* is an albuminous substance; that is, one in chemical composition and nutritive value something like white of egg. Casein is coagulated by the gastric juice. The milk of the human female contains less casein than that of the cow. The casein in human milk, when precipitated, forms a finer precipitate than that of cow's milk. Cow's milk forms large masses of curd, human milk only fine grains. Hence it is believed that the casein of human milk must differ in chemical composition from cow's milk, although chemists have not yet found out in what the difference consists. Casein is not present in the blood, and

therefore it must be formed by the cells in the breast.

Butter is formed out of albuminous material by the cells of the breast. It is formed in animals who live on flesh without any fat; so that it must be formed from flesh.

Sugar also does not exist in the blood, and therefore must be formed by the cells of the breast. The amount of sugar in the milk does not depend on the amount of sugar or starch the nursing woman eats.

The amount of *water* in the milk is not regulated by the blood-pressure or by the amount of blood going to the breast; but the amount of blood that goes to the breast depends upon the amount of water which the breasts require.

As the important constituents of the milk are formed from albuminous matter, it follows that the nursing mother can hardly eat too much animal food. If the mother continues equal to her task, as the child grows the milk comes to contain rather more casein and rather less sugar and fat.

Quantity of the milk.—It is difficult to measure accurately the amount of milk which a nursing mother produces; and some women, no doubt, make more milk than others. Attempts have been made to measure it. The following figures have been got by roughly harmonising different observations:—During the first day about an ounce is secreted; during the second day, about three ounces. Then the breast begins to produce milk more freely, and the quantity rapidly increases till at the end of the first week about three-quarters of a pint per day is produced. At the end of the first month about a pint is the daily average. As the child grows stronger it needs more, and therefore the quantity ought to go on increasing, till at the end of seven months about a pint and a half of milk is furnished daily. These

figures are rough averages, based on few observations.*

The conditions influencing the quantity and quality of the milk are imperfectly known. The amount and quality of the milk depend chiefly upon constitutional peculiarities which we cannot define. Breeders of animals know well that certain stocks produce good milk abundantly, while others give poor milk and little of it. In the human race the same thing holds good; but owing to breeding not being carried on in the artificial way in which animals are bred, we cannot assert before delivery (except from the experience of the patients) that the milk will be abundant or the reverse. No doubt, upon the average, robust women with large breasts would be found to produce more milk than weakly women with small breasts; but in individual cases you cannot predict the amount or quality of the milk either from the appearance of the patient or the size of her breast.

Influence of age.—Women produce the most and the best milk at the ages at which they produce the largest and strongest children—that is, between twenty and thirty. Before twenty, and after thirty, the milk is poorer.

Influence of the uterine functions.—If pregnancy occur, the amount of the milk is usually diminished, although sometimes women go on suckling up to the end.

If menstruation take place during suckling, the quantity of milk is somewhat less at the time of menstruation; and the infant has been noticed to get restless, fretful, and pale at this time.

Influence of the mother's health.—The

* See Tarnier and Chantreuil, "Traité de l'Art des Accouchements," vol. i.; and Kehler, in Müller's "Handbuch der Geburtshülfe."

quantity and quality of the milk depend on the general well-being of the mother. The better fed she is the better the milk. Moderate exercise in the open air, by improving her health, improves the milk; but fatigue lessens the quantity. Strong and painful emotion, such as that of fright or anger, may not only diminish the quantity of milk, but so change it as to make it produce fretfulness, colic, diarrhœa, or vomiting in the child.

Influence of disease.—In febrile diseases the milk is lessened or stopped altogether. In phthisis it is said to be more watery and to contain less fat. In osteo-malacia it is said to contain an excess of lime, the lime absorbed from the bones being got rid of partly through the milk. In jaundice biliary acids have been found in the milk, but do not seem to hurt the child.

Effect of drugs.—Many drugs when taken by the mother pass into the milk, and so affect the child. Among these are iron, bismuth, iodine, arsenic, zinc, antimony, mercury, lead, sodium chloride, carbonate and sulphate, potassium iodide, iodoform, salicylic acid, atrophin, chloral, opium, rhubarb, scammony, borax, magnesium sulphate.

Remember that only a very small part of the drug that is given to the mother goes into the milk, and therefore the fact that by chemical tests the substances above named can be detected in the milk of a mother who has swallowed them is not of great practical importance.

Nervous influence.—The secretion of milk is greatly dependent on nervous influences. The most powerful provocative is the putting of the child to the breast, and, in less degree, the sight of the child or the thought of suckling it. The feeling thus produced is called the "*draught*." It is described as beginning within a minute or two after

the application of the child, as a pricking, burning, or shooting feeling, going from the periphery of the breast towards the nipple. The veins become full and the nipple swells. This is followed by a flow of milk from the nipple, whether the child is there or not. This flow may last a few minutes or go on as long as the child sucks. The amount of milk that flows from the breast as a consequence of such reflex provocation has been estimated at from 8 to 16 per cent. of the amount of milk present in the breast.

If the child is regularly put to the breast, the breasts begin to fill again after each suckling, without special stimulus; but they fill faster if the mother's thoughts are directed towards it. The more frequently the breast is emptied the more abundant is the milk. The two breasts are not always alike either in the quantity or quality of the milk they produce. They often differ in size, and sometimes the infant shows a preference for one breast rather than the other.

Advantages of nursing.—Always advise the mother to nurse the baby, unless there is a good reason to the contrary. Its natural food is better for the baby than any other; so that the mother, if she nurse it, is more likely to have the satisfaction of seeing it thrive. If she does not nurse, she is more likely to be soon again pregnant.

Frequency of suckling.—It is good to put the child to the breast immediately after delivery, because the irritation of the breast stimulates the womb to contract. But when the uterus is contracted and retracted, and the nurse has made the patient dry and clean, the patient should if possible sleep. Therefore for the first few hours after delivery she should not be disturbed by the baby.

The child should be put to the breast about three times in the first twenty-four hours, because it will

get a little milk, and because the effect of the child's sucking is to stimulate the secretion of milk. It is no use putting it oftener, because there is so little milk. The child should not be kept at the breast longer than a few minutes, for fruitless sucking is useless irritation of the nipple, and may do harm to the child. In the second twenty-four hours, if the milk is not yet plentiful, do the same. On the third day the milk will be more abundant, and the child may be put to the breast oftener. When the secretion of milk is fully established the child should be put to the breast every two hours, to one breast only each time. Each breast should be used alternately. From ten to twenty minutes' suckling will be enough to empty the breast; therefore this is long enough for the child to be kept to it. At each meal the child should get from an ounce and a half to three ounces.

Precautions whilst suckling.—The child ought not to be allowed to go to sleep while suckling; nor ought the nurse to let the mother go to sleep with the child at the breast. Either piece of neglect leads to the nipple and the child's mouth not being properly cleaved after suckling, and thus favours the occurrence of thrush and of mammary abscess. It may lead to more serious consequences, for a drowsy mother mechanically pressing her child against her breast may thus block its mouth and nostrils and suffocate it. This has happened. A careful mother, while suckling, presses the breast back with her fingers, away from the child's nostrils.

When the meal is over the child should be taken from the breast. The child's mouth should be wiped with a soft rag dipped in clean water, lest particles of milk should cling about it and decompose. The nipple should be washed with clean water and carefully dried, for the same reason.

After the first two months the child should be

gradually trained to go for six or seven hours at night without feeding, so that the mother may get a good sleep. The child ought not to be put to the breast to keep it quiet whenever it cries—first, because by disturbing the mother it interferes with her health, and thus with the quality of the milk; and, second, because the child is not given time to digest its food, and thus indigestion is apt to follow. After the child has been suckled, it ought to sleep for two, three, or four hours. But rules like this must not be too rigidly kept, for prolonged crying injures the child, and the mother's judgment as to the fulness of the child's stomach may be in error.

Difficulties in suckling.—It is sometimes difficult, especially in the case of a premature child, to get it to grasp the nipple and suck. The devices of nurses for this purpose are many. Great patience is the principal thing, and care in seeing that the nipple is properly placed in the child's mouth and is not under the tongue. If this fail, draw a little milk with a breast-pump; put a few drops in the child's mouth, and let a few drops continue to moisten the nipple, so as to introduce the child to the taste of milk, and guide it to the source of further supply. Sometimes even with strong, healthy, full-term children it may be a week or two before they can be got to take the breast properly.

There are more important causes which may prevent the child from taking the breast properly, which must not be forgotten. The child's mouth may be sore from thrush, or stomatitis, or syphilis; it may be deformed, as for instance by cleft palate, or by a tumour of the tongue, lips, or gums; or unable to suck from paralysis of the facial nerve from compression by forceps in delivery. This always passes off in a few days. Tongue-tie is a favourite explanation among women of difficulty in suckling. No one

has ever yet seen a tongue-tied adult ; so that tongue-tie (that is, shortness of the frænum) does not persist, even if it exist at birth.* But a small snip of the frænum linguæ with blunt-pointed scissors does no harm that we know of, and, unnecessary as it is, the importunity of nurses will probably for a long time to come lead to its being frequently done.

Mis-shapen nipples.—The fault may be in the nipples. A well-formed nipple should be thimble-shaped, should project about half an inch from the breast, and should be capable of being pulled out further. The worst kind of nipple is that which is in a depression ; so that when the child tries to seize it, it slips away and sinks deeper into the hollow. Nipples are met with intermediate in shape between these good and bad types. Sometimes it seems as if the milk ducts are too short, so that the nipples cannot be drawn out ; sometimes the nipple is hollowed at the top.

Evidence of good lactation.—The best proof that the child gets enough good milk is that it thrives. But it is possible by watching the child suck to find out. When the child sucks, its gums grasp the nipple at its base. Its lips are applied to the skin around, so as to prevent any air getting into the mouth. The top of the nipple is received between the tongue and palate. Then, the tongue being separated from the palate and made concave, a vacuum is created round the top of the nipple, into which the milk flows. The tongue being then quite separated from the palate, the milk flows into the mouth. About half a dozen repetitions of this process so fill the mouth with milk that the child stops

* Burns ("Principles of Midwifery," 3rd edition, p. 461) says : "I have not seen two children where it was really necessary to perform any operation, for in all the rest the child sucked the finger or a good nipple very readily."

sueking and swallows. If the breast contains very little milk, the child has to do more sueking than this before it gets enough to swallow ; it may get tired before it is satisfied, and go to sleep at the breast. If there is a great deal of milk, the child may swallow with almost every movement of suction, and milk even run out of its mouth by the side of the nipple.

If the child gets enough milk out of the breast, it does not go to sleep while at the breast ; it seems satisfied, does not cry, and when put in the cradle after sueking at once goes to sleep. The child ought to get enough in ten or fifteen minutes ; if it goes on for more than twenty minutes, the supply of milk is poor. If the baby has taken too much milk, it vomits it. With vomiting from this cause alone the child shows no signs of distress, but seems better after the vomiting, and its motions are healthy. Vomiting from disordered digestion is accompanied with signs of distress and an unhealthy condition of the stools. Constipation without other symptoms generally indicates too little food ; diarrhoea usually denotes over-feeding or improper feeding. When the breasts produce an excessive quantity of milk it is generally watery. If this be the case it is a good practice to express some milk from the breasts before the child is allowed to suck, for the milk last drawn from the breasts is the richest.

If the child sucks well, sleeps well, and passes healthy motions, the probability is that the milk suits it ; but its progress should nevertheless be tested by periodically weighing it.

Chemical and microscopical examination of the milk cannot yet give us trustworthy data for predicting its nutrient qualities. Depaul states that he has found milk rich in the ingredients supposed to be advantageous, yet disagree with the child : and infants

thrive well on milk which when tested only reached a very low standard.

Caking of the breasts.—This term (of American origin) is a convenient and expressive name for one of the commonest causes of slight fever during the lying-in. It is the only disease to which the old term “milk fever” can be properly applied. It is due to imperfect emptying of the breast. It does not always lead to abscess, but a patient with caked breasts is more likely to get abscess than one whose breasts are emptied.

The symptoms are, first, fulness and tenderness of the breasts; then throbbing, aching pain, extending round the chest and down the arm, aggravated when the breast is let to hang down. The breast feels hot. It is large, hard, and knotty. The caking generally begins in the upper and outer quarter of the breast. There is slight fever, seldom exceeding 101.5° , but it may be as high as 103° . The pulse is quick, may be 80 or 90, but not so quick as the height of the fever would make you expect. With the fever there is headache, backache, and sweating.

Caking of the breasts generally begins on the third or fourth day. The fever, if the patient is properly treated, only lasts a day; but it may extend over two or three, or even five, days without going on to abscess.

Treatment.—In the treatment of caked breasts the great things are—(1) emptying the breast, (2) supporting the breast.

(1) *Emptying the breast.* The child cannot do this; if it could, the breast would not have caked. Therefore use either a breast-pump (Fig. 81) or a soda-water bottle, as described in the next paragraph.

If the nipple should not stand out sufficiently for the child to take it, it should be pulled out with the fingers before putting the child to it. If this is not successful, a nipple shield should be

used. If the child cannot draw the milk through the shield, the nurse should put her lips to the shield and fill it with milk, so as to give the child an easy start. There are nipple shields made, fitted with two tubes, by one of which the mother can herself suck the milk into the shield, while the child sucks it out with the other; but these are rather more expensive than simple shields. If there be no shield at hand, the nipple may be drawn out by filling a soda-water

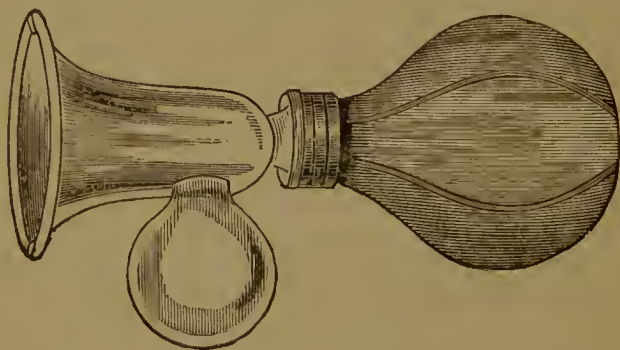


Fig. 81.—Breast-Pump.

bottle with *hot* water, emptying it, and applying the mouth of the bottle over the nipple. A napkin or pocket-handkerchief wrung out in *cold* water should then be wrapped round the bottle. The hot bottle makes the air inside it expand; when it is cooled, the air inside shrinks in volume, and the nipple is sucked in.

After the child is taken from the breast the nipple should be washed, and carefully dried with a soft napkin. A woman pregnant for the first time should be instructed to wash the nipples night and morning during the last month of her pregnancy with equal parts of brandy or whisky and water, or *can-de-cologne*, in order to harden them. This often prevents sore nipples.

(2) *Supporting the breast.* This will relieve pain and lessen congestion by helping both the return of blood through the veins of the breast and the outflow of milk through the milk ducts. The most effective way of supporting is strapping. Take a strip of adhesive plaster two feet long, and as broad up to six inches as you can get it. Place the middle of the strapping under the breast and bring the ends up, attaching one end round the chest under the armpit of the same side, the other across the front of the chest and over the collar-bone of the opposite side. If the strapping be less than six inches wide, apply other pieces of strapping in the same way, until the breast is thoroughly held up from its base to the nipple. This is the best way of supporting the breast. The objection to it is that the pulling-off the strapping is disagreeable, and that the strapping leaves dirty marks. Strapping thus applied will hold the breast up for two or three days. If you think the patient will not like strapping, sling the breast by a large pocket-handkerchief or a napkin folded diagonally, so that the thick part goes under the breast and the thin ends are knotted over the neck. The objection to this is that if you trust to it alone the handkerchief will soon become like a rope, and the breast will hang down over it. But the handkerchief will keep the breast up while you apply a broad binder, like that used after delivery (p. 82), round the chest-wall, reaching up to the armpits. Fasten this as tightly as you can. The binder and the handkerchief will keep the breast up, but not so well as strapping. The arrangement will need re-adjustment twice a day, but the re-adjustment will not be so disagreeable as the taking off and re-applying of strapping.

These two things, emptying and support, are the important ones. Other less important measures are hot stupes—steaming hot cloths applied to the breast

every two or three minutes for a quarter of an hour or longer. These may be applied when the binder has been taken off for re-adjustment, or, if strapping is used, be put to the upper surface of the breast. They act as what is called a revulsive; they draw the blood to the skin of the breast, and thus relieve congestion of the deeper part. Also give a saline aperient. These, by draining off fluid by the bowel, somewhat lessen the quantity of the milk. Give two seidlitz powders each morning, or a mixture like this every four hours:—

Mag. Sulph. ʒj.
Sodæ Sulph. ʒj.
Spt. Chlorof. ʒss.
Aq Cinnamonī ad ʒj.

When to stop the flow of milk.—In some cases we have to stop the milk-flow. (1) *Social reasons.* It may be that the mother, for reasons which to her are sufficient, does not choose to suckle. There may be social reasons which others can understand; the mother may have to earn her living by an occupation which she cannot follow if she has to suckle a baby. (2) *Deficiency of milk.* If the mother has not enough milk for the child, it will not thrive; it will be thin and fretful. If so, the mother's milk must be first supplemented and then replaced by another food. If, although she has not enough milk for the baby, she goes on trying to nurse it, the stimulus of suckling may provoke the breast to secrete more than her strength will bear, and she will come to suffer in health herself. She should not, therefore, go on trying to nurse the baby. But weaning in such a case should be gradual, not sudden. The child should be bottle-fed when it is hungry and the breasts are not full, and only put to the breasts when they are full. (3) *Bad shape of the nipple.* The nipple may be so misshapen that the child

cannot suck, and that all treatment designed to help it fails. In such a case weaning is necessary; there is no choice. (4) *Bad health of the mother.* In acute diseases nature generally settles the question by stopping the secretion. In chronic diseases which weaken the mother the milk secretion generally soon ceases. But often women go on nursing longer than they can, without loss of strength, produce milk, and then they get symptoms indicating nervous and muscular debility. They lose flesh, get backache, bearing-down pains, palpitation, sense of fatigue, weakness of sight, poor appetite, loss of sleep, nervousness, failure of memory, inability to concentrate attention, lowness of spirits. When symptoms like these are complained of by a nursing mother, her child ought to be weaned, whether she wishes it or not.

How to stop the flow of milk.—To stop the flow of milk the great thing is to remove the stimulus of sucking. If the baby be not put to the breast the milk will cease to be secreted. There is no treatment that will stop the production of milk in a healthy woman so long as the baby is regularly put to it; nor is there any treatment that will make a breast to which a baby is not put produce milk. If the breast is producing milk and the child is not put to it, the breast is apt to get caked and to need the treatment described on pp. 179-182. The drug usually used to drive away the milk is belladonna. This is sometimes used spread on leather—a round plaster, with a hole in the middle for the nipple, applied to the breast—a bad way, because if milk is produced after the plaster is applied the breast will enlarge, and then the pressure of the unyielding leather will cause pain. It is also used as a liniment, made by mixing equal parts of extract of belladonna and glycerine. This is put upon lint and laid on the breast. In

either form belladonna has a strong smell, a dark colour, and makes the skin dirty—qualities apt to make the patient think that it cannot be inert, and therefore its use often gives her mental satisfaction. It has never been proved to have any effect on the secretion. If the child be kept from the breast, the milk will go away as soon without belladonna as with it. Saline purges may be given, for the same reason as in caking of the breasts. Iodide of potassium in large doses, 20 or 30 grains, given twice or thrice daily, has a remarkable effect, according to Dr. Playfair, in lessening the quantity of milk.

Relieve distension of the breasts by gently rubbing them with warm oil, in a direction from the circumference to the centre; this will favour the outflow of milk. The use of the oil is to lessen the irritation of the skin by the friction.

Soreness of the nipples is very common. If not properly looked after, about half of all nursing mothers suffer in this way. It is more common in nursing the first child than subsequent ones. It is more common in delicate than in robust women. It is especially apt to occur when the child is strong, and grips the nipple hard when there is very little milk; when the nipple is badly shaped, so that the child has difficulty in getting it; and when the nipple is not properly washed and dried after suckling, or is very warty.

Soreness of the nipples generally begins soon: in most cases within the first three days. There are two chief kinds of sore places: One is at the top of the nipple, and begins as a little vesicle or bladder, or several of them, about the size of a pin's head. These soon break, and dry up into black or brown crusts. If these are picked off (which there is no need to do), sore, easily-bleeding places will be found beneath them. If they are properly treated they

will generally heal by the end of the first week. The other sort is a crack or ulcer, which runs round the base or side of the nipple—usually at the place where the nipple joins the breast. This is produced by the biting and pulling of the child; and the crack is usually where the child's upper gum seizes the nipple. If such a crack is present, care should be taken that the child is not put to take the breast in such a position that the nipple is pulled upon so as to stretch open the crack. This form lasts longer than the one first described. Nipples so affected may remain sore a fortnight or more.

Painful fulness of breasts.—Sometimes—especially if the nipples are sore, or the child feeble—more milk is produced than the child draws out; the breasts become very full, swollen, knotted, hard, and tender; and this condition may make the patient feverish, and if not relieved, may go on to abscess. If the breasts are so full as to be uncomfortable, they should be emptied by a breast-pump or a soda-water bottle. If the child was stillborn, or has died, or the mother is not going to suckle her child, this may be repeated as often as necessary, and will soon cease to be required; for if the breasts are deprived of the stimulus of a sucking baby, they soon leave off producing milk. It would often be very desirable, in the case of babies too feeble to suck, or nipples too badly-shaped for the baby to grasp them, to draw the milk from the breast with a pump, and give it to the child with a spoon; but as a rule this cannot be done, for the breast soon ceases to produce milk when the child is not applied to it. You need not, therefore, prescribe any medicines to drive away the milk. See that the breasts are made comfortable, and the milk will go away if the mother does not suckle.

CHAPTER XVI.

ON GERMS, DISEASE, AND ANTISEPTICS.

Microbes, and what they do.—The air is full of living matter. When a beam of light is let into a dark room, in the track of the beam a fine dust is seen floating in the air. In every place that men inhabit this dust is formed of (among other things) innumerable living particles, seeds of small plants, and also living things too low in organisation to be called either plants or animals. These living things can only be seen by a very powerful microscope, and some of them cannot be seen even by the most powerful microscopes until by the use of chemicals they have been stained a dark colour so as to make them conspicuous. They are spoken of as micro-organisms, microbes, or germs. Mr. Darwin left a plot of ground, two feet by three (which he called his “weed garden”), quite uncultivated, to see what would happen—he neither sowed, nor manured, nor weeded it. In three months 357 different weeds had sprung up in it. This shows what a number of seeds there are floating about in the air; but this observation only shows how many seeds there are which grow into plants big enough to be seen. The seeds of plants of microscopic size are innumerable. Now, just as the higher animals feed upon animal and vegetable matter, and after digesting it excrete it in the changed and noxious forms of urine and fæces, so these germs feed upon organic fluids and solids, and as they consume them, alter them. Some feed upon milk, and turn it sour; others upon bread, and make it mouldy; others upon flesh, and make it putrid. It is through microbes that urine left in a vessel a few days comes to stink.

If milk, or meat, or urine be kept free from germs, it will remain unchanged for any length of time. The germs can be killed by heat or by certain chemicals. Thus, preserved meat is freed from germs by boiling, which kills the germs. In museums, parts of animal bodies are kept unchanged by being immersed in spirit, which kills the germs, and so prevents putrefaction.

Action of microbes in the body.—There are microbes which feed upon the tissues and fluids of the human body. Some are able to live and multiply in the *living* body. By doing so they produce disease. There are many different kinds of them, and they produce many different diseases. The diseases which are most important in the case of lying-in women—because those which, in consequence of delivery, she is especially liable to get—are those caused by germs which enter the body through wounds, and multiply in the blood. The chief forms are called septicæmia, pyæmia, diffuse inflammation of the cellular tissue, and of the peritoneum. These diseases are very dangerous, and generally fatal.

Microbes in the secretions.—There are other germs which can live in the tissues of the body when those tissues are dead, or in the fluids of the body after they have been separated, but which are destroyed by the living tissues. Germs of this kind can live in the lochial discharge, and then alter it and make it stink; and if the patient be not kept clean, and this stinking discharge be allowed to accumulate, it may be absorbed, and make the patient ill. But in this disease (which is called *sapremia*), as the germs do not enter the blood, the patient quickly gets well when the discharge which the germs have rendered poisonous is washed away.

With regard to this disease **some practical points** must be remembered. First, the patient may

be clean externally, and yet there may be, high up, in the uterus or top of the vagina, some poisonous discharge which is not flowing away as it ought to do, but is poisoning the patient. So you must not think that because no bad smell is perceived about the patient, or the discharges that can be examined, therefore the secretions are perfectly healthy. Secondly, the discharge may smell badly, and yet, if it flow freely away, it may not be absorbed—or rather, not enough of it may be absorbed to make the patient very ill—and so the offensive discharge may do no mischief. Do not, therefore, take upon yourself to judge from the character of the discharge whether the patient is doing well or badly. This is one of those details the importance of which only a well-trained medical man can estimate. But if the discharge be offensive, it shows that the patient has not been well taken care of.

How microbes come to attack patients.

—These germs all come from without. They are brought to the patient; the patients do not breed them. The most poisonous germs—those that enter the body by wounds, and grow and breed in the discharges and in the blood—are hardly ever found in places where houses are kept clean and people not crowded together. But in hospitals, where wounds abound, they find their pasture so abundant that they can only be kept down by incessant care. Before Lord Lister introduced antiseptics these diseases were never absent from hospitals: they could not be kept down. Every lying-in hospital in London has had from time to time to be shut up because these diseases prevailed in it. They prevailed because the germs had got into the hospital, and being continually present in it, floating about in the air, adhering to instruments, to the hands of the attendants, etc., were transferred from patient to patient. They were only

got rid of by shutting up the hospital, thus depriving the germs of their food, and preventing their multiplication ; and then by plenty of washing they were got rid of for a time.

Antiseptic treatment.—Lord Lister discovered that these diseases were due to germs, and could be prevented by killing the germs. The drugs that kill the germs are called *antiseptics*. The precautions that are used to prevent germs from getting to the patient, and to kill them if they do get to her, are called *antiseptic treatment*. Anything that is perfectly clean and has no germs of disease or putrefaction attached to it is said to be *aseptic*. Antiseptics are used to make things aseptic.

Why necessary.—Some people think that antiseptics are not necessary, and point out what good results have often been got without them. In private houses, especially those in the country, the patient and her surroundings are generally free from germs of disease, although those of putrefaction are everywhere present in Great Britain. In practice among such patients, if antiseptics are not used, septic diseases do not occur so long as the lochia flow away properly, and the soiled napkins are removed from the patient before they have time to stink. But we never can be absolutely certain that everything is aseptic ; and in hospitals we may be sure that if antiseptics are not used things will not remain aseptic long. In hospitals, therefore, no detail of antiseptic treatment should be omitted, and a lying-in woman wherever she may be is safer if antiseptics are used. The only reason for not using them is that if carelessly used harm may be done. But antiseptic treatment does not do harm if carried out carefully.

The **antiseptic precautions** used in midwifery practice are of two kinds : (1) those which aim at rendering aseptic everything which comes into contact

with the patient, and (2) those which aim at killing any germs that may already have reached her. Of these, the first are the more important, for, as women do not themselves breed disease germs, if we could be sure of making everything round her antiseptic there would be no need of the second class of precautions. The first class comprises perfect cleanliness of the attendant's dress and of the patient's linen, the cleansing of the attendant's hands and nails with soap and water and a nail brush, and the soaking of them in an antiseptic solution, and the cleansing of instruments by boiling. The second class consists in the use of vaginal douches of antiseptic fluids.

The **antiseptics in common use** are *corrosive sublimate*, *biniodide of mercury*, *carbolic acid*, and *permanganate of potash*, a solution of which is sold by all chemists under the name of *Condy's fluid*.

The **mercurial antiseptics** are the most powerful. So far as we know, there is no living thing that they will not kill. The disadvantage of their use in midwifery practice is that if used without proper precautions the drug may be absorbed, and poison the patient. But it cannot poison instruments, and no harm can result from dipping the hands in it. When corrosive sublimate solution meets albumin, albuminate of mercury is formed. The douche fluid that went in clear comes back containing little red particles of albuminate of mercury. In proportion as this change takes place, the sublimate solution is rendered inert as an antiseptic. Biniodide of mercury solution is free from this objection, and is therefore preferable. Therefore, if you want to make your patients safe, take mercuric biniodide with you, and let the nozzle of the syringe and the catheter which you may use for the patient lie in the mercurial solution before use. The sublimate solution decomposes soap, and therefore you cannot use the sublimate solution for

washing your hands ; you must dip the hands in it *after* washing. This does not apply to biniodide of mercury, which can be used with soap. Immediately after labour is ended, the vagina should be syringed with a mercurial solution of 1 in 2,000. It is not necessary to syringe the uterus, except in cases in which it has been necessary to pass the hand into the womb ; and, as in such cases you should have sent for your superior officer, he will direct whether this should be done or not, and how it should be done. If any germs have been accidentally carried up to the neck of the womb, they will have been washed down into the vagina by the hæmorrhage accompanying the third stage of labour. Germs may get into the vagina from the air, and therefore it is safer to wash out the vagina, and it is harmless if properly done. The essential precaution in doing it is to *see that all the injected fluid escapes*. After the injection is finished, press on the lower part of the abdomen, pressing the uterus downwards and backwards, in the same way as when you pressed out the placenta. This will press out all the fluid, so that not enough of it will be absorbed to do harm. A solution stronger than 1 in 2,000 is slightly irritating to the mucous membrane, and it has been found by experience that 1 in 2,000 is strong enough.

In well-managed lying-in hospitals a vaginal douche of 1 in 2,000 mercurial solution is given night and morning for the first three days, because it is during these days that the risk of infection is greatest. After the first three days, a douche of 1 in 4,000 is given until the lochia have stopped. In most patients no harm whatever follows these douches. In hospitals, the very first symptoms of poisoning are at once detected, the solution is left off, and the symptoms quickly subside.

In attendance on patients at their own homes, remember that if, when a mercurial douche is given,

all the fluid is not well pressed out afterwards, there is great risk of poisoning. Also that if the use of mercury is continued after symptoms of poisoning have appeared, the symptoms may become serious. For these reasons do not let any one but yourself administer mercurial douches to a patient under your care. And as the risk of septic poisoning is less in private houses than in hospitals, and circumstances may prevent you from visiting the patient twice a day, it is better, in private houses, not to use during the lying-in period a dangerous antiseptic.

These douches during the lying-in period are the least important of the antiseptic precautions. If the labour has been natural, if every precaution has been observed during its course, and if an efficient antiseptic douche has been given at its close, vaginal douches during the lying-in period are probably superfluous so far as the prevention of septic infection is concerned, although they make the patient cleaner and more comfortable. Moreover, it is possible, if the nurse is careless about the cleanliness of her syringe, and the proper preparation of the douche fluid, for these douches to do harm. Therefore, if there be any doubt as to her competence and carefulness, it is better not to prescribe them at all.

In special cases it may be well to use biniodide of mercury during the lying-in period, even in private—such cases, for instance, as those in which the child is decomposing, and the discharges in labour are offensive; cases of very long labour; cases of placenta prævia; or cases in which the patient before labour has had a profuse yellow discharge. As to this, get further advice before employing it.

The first symptoms of **mercurial poisoning** are a coppery taste in the mouth, soreness of the gums, with the formation of a red line where they join the teeth, and diarrhœa. If these symptoms

appear in a patient who is having mercurial douches, they should be left off at once. If the symptoms are severe, further advice should be sent for, and you should be careful to let whoever has to prescribe know that the patient has had mercury used to her, lest he should prescribe opium, which is dangerous in cases in which diarrhœa is due to mercurial poisoning.

Carbolic acid solution of a less strength than 1 in 40 cannot be relied upon as a disinfectant. A stronger solution than this is irritating. Carbolic acid must be carried in a bottle, and the strength of the solution measured; and this is less convenient than carrying tabloids or pastilles, which go in the pocket or bag. Therefore, carbolic acid is not so convenient as sublimate, or biniodide of mercury, besides being less trustworthy. It is an excellent antiseptic to use after labour, but not so convenient as Condyl's fluid.

A solution of *permanganate of potash* is sold everywhere, under the name of **Condyl's fluid**. It is decomposed by the secretions of the vagina, and turned from the rich purple, which is its proper colour, to a brown. So long as this change in colour takes place, the fluid is incapable of doing any work as a disinfectant. The nurse should make a solution of the strength of two table-spoonfuls of Condyl's fluid to a quart of water, and go on syringing the patient with it, using more than one quart of the solution if necessary, *until the fluid returns exactly the same colour as it went in*. When it does this, it has a powerful antiseptic effect; but until it does this it is useless.*

Iodine is sometimes used as an antiseptic in midwifery practice, ʒij of tincture of iodine being mixed with a quart of water. This is more expensive than either sublimate or Condyl's fluid. It has this further disadvantage, that when a watery solution of iodine is exposed to the air, the iodine rapidly evaporates.

* See Baxter: "Reports of Med. Off. of Privy Council, 1875."

CHAPTER XVII.

THE INFANT.

The nurse's duty.—After labour, the nurse should not set about washing the baby until she has done everything necessary for the mother—has cleared away the soiled draw-sheet, applied a clean pad or napkin, and put on the binder if so directed. She should, before she begins, see that everything that is wanted for washing and dressing the child is at hand. In the interval, the child should be left in a safe position near the fire.

98. The nurse should wash the baby in water at the temperature of 98°. The eyes, mouth, nose, and ears should be first cleansed with especial care and gentleness. The child's body is covered with an adherent cheesy coating, which is called the *vernix caseosa*. To remove this, the skin must be gently rubbed with oil or vaseline. Then this must be washed off with soap and water. Ordinary yellow soap is as good as most fancy kinds. The child should be well lathered all over with a piece of soft flannel, and then dipped in the bath, and the soap well rinsed off. When the child is in the bath, by placing the left hand under its back, and at the same time supporting the neck with the fore-arm, a sufficiently firm hold on the child is obtained, and the head is prevented from falling back into the water, while the right hand is left entirely at liberty. After the soap has been rinsed off, the child should be quickly dried and powdered—especial care being taken to thoroughly dry and well powder all creases and folds of the skin—in front of the fire, and not unnecessarily exposed to the cold air. Before dressing the child, care must be taken to see that the

cord has been properly tied, and that there is no oozing from the stump.

In **dressing the umbilical cord**, the essential thing is to keep it *dry* and *clean*. If it be not kept *dry*, it will stink. If the dressing put to it is not *clean*, disease may be produced. If it be kept dry and clean, it shrivels up without smell, and drops off in about five days.

The best method of dressing it is to powder it well and wrap it up in clean dry wool. Among the poor the customary dressing is a bit of rag which has been scorched at the fire; a hole is cut in the middle of this, the cord put through the hole, and the rag folded over it. This is a very good dressing, because the scorehing of the rag ensures its being dry, and destroys any germs that may be attached to it. Sometimes, until the cord has separated, the child is washed every day without being immersed in the bath. In that case the dressings of the navel-string are left undisturbed, and it is necessary to guard against wetting them. Sometimes the child is bathed every day, and the dressing of the cord renewed each time. As to this, the nurse must be guided by circumstances.

Hæmorrhage from the cord.—Occasionally, soon after birth, some oozing of blood may be found taking place from the navel-string. This is due either to the ligature being not tight enough, or having slipped in consequence of not being properly tied, or being too thin, so that it has cut through the vessels instead of compressing them. If there be oozing, the cord must be tied again between the first knot and the child's abdomen, taking care to avoid the fault that made the first tying inefficient.

Diseases of the umbilicus.—If germs of disease have got access to the umbilicus—which may happen if proper attention is not paid to cleanliness—

it may become inflamed. There may be *inflammation*, slight or severe, of the skin round it, or the umbilical vein may become inflamed. The latter, when it occurs, often leads to fatal blood-poisoning. Your duty is to prevent these diseases. If they occur, you should seek further advice.

Sometimes after the fall of the cord the umbilicus is slow in healing. The best treatment is to keep it clean, and apply a little zinc ointment on a bit of clean rag, the ointment being pushed down to the bottom of the umbilical depression. If the umbilicus has not healed at the end of three weeks, advice should be sought.

There may be *hernia*: that is, a protrusion of bowel from deficient closure of the umbilicus. This may be present at birth, the protrusion being into the cord, and having for its outer covering the amnion, which should cover the cord only. This condition is rare. It is a very serious one, for it is usually fatal if not treated. If you think it present, further advice should be sought at once. After the umbilicus has healed a slight protrusion is very common, and usually diminishes and disappears as the child gets older. If the protrusion be larger than a nut, advice should be sought. The treatment is to hold together the skin at the sides of the opening, and then put on a broad piece of strapping to keep them together.

It takes about three weeks for the child to get fully accustomed to the conditions of independent life. Certain structures which fulfilled important functions while it was in the womb gradually waste, and practically cease to be; and other parts, especially the lungs and stomach, take on a new activity. These changes take about three weeks for their full accomplishment.

The cry.—After the child has begun to breathe, almost the first thing it does is to cry: because it feels

cold, and is exposed to unaccustomed pressure. The use of the cry is to make known the child's wants, and to call attention to anything that hurts it. The cry is composed of two noises: a weak wail as it is drawing in its breath, and a loud squall produced by air passing out of its windpipe. Strong children cry more loudly than feeble ones, and in them the inspiratory sound is very slight; but in very small or weakly children it is sharper and longer. Hence the character of the cry is an indication of the well-being of the child. If a child cries long, its brain and lungs become greatly congested, and this is injurious. The nurse, therefore, ought not to let a child go on crying, but should try to find out why it is crying.

Effects of labour on the child's head.—At birth the child's head is often slightly deformed, from compression during labour, partly from alterations in the shape of the bones by squeezing, partly from swelling of the soft parts covering the bones. The precise changes in shape that take place depend upon the position in which the head has been delivered. The changes in the shape of the bones get much less in the first few days, but often persist in a slight degree throughout life.

Caput succedaneum.—When labour is long, the head is so pressed on by the wall of the genital passage that the vessels of the scalp are compressed, and the circulation through the part beyond the girdle of pressure is impeded. Hence there is effusion of serum, and often of blood, into the loose tissue under the skin of the part which, being in advance of the girdle of pressure, is not so much pressed on. This kind of swelling is called the *caput succedaneum*. It forms a soft doughy swelling, which, as a rule, is greatest over the part which presented at the os uteri. (This part, in the first position, is the upper and posterior angle of the right parietal bone.) From the

point where there is most swelling it diminishes gradually all round, without any sharp edge or line of demarcation. It all disappears in a day or two. After delivery with the face presenting, swelling of the face of a similar nature may make the child's appearance repulsive; but you may comfort the mother by telling her that it will soon go away. After delivery with the breech presenting, the scrotum may be greatly swollen. This also will quickly diminish.

Cephalhæmatoma.—In some few cases there is hæmorrhage, not into the loose tissue underneath the skin, but between the pericranium (the membrane covering the bone, from which the bone is formed) and the bone. This is called *cephalhæmatoma*. This swelling differs from a caput succedaneum, in that it is limited to the space over one bone, never transgressing a suture. It is usually over a parietal, less often on the occipital bone. There may be more than one such swelling, but this is very rare. Further, during the first two or three days the cephalhæmatoma, instead of disappearing like the caput succedaneum, gets a little larger. It is firmer and feels elastic, not doughy. It is bluish in colour. After a few days the pericranium (the bone-making membrane) begins to form bone. It does this at the edge of the swelling, because here it is best supplied with blood. Therefore, in about a fortnight you feel a soft, elastic swelling, evidently containing fluid, with a hard raised edge all round, as if the fluid were in a cup sunk in the skull. The fluid is gradually absorbed, and the swelling disappears in a few weeks. Neither caput succedaneum nor cephalhæmatoma requires treatment.

Cyanosis.—Some children are born with heart disease. You will suspect this if, after breathing is well established, the child's skin and lips do not acquire the natural rosy tint that they should, but its

skin and lips are bluish, like those of a child in suspended animation. This blue condition is called *cyanosis*. If there are symptoms of this kind further advice should be sought.

Loss of weight.—The average weight of a newly-born child is from 7 lbs. to 8 lbs. During the first three days of life children lose weight, on the average, to the extent of not quite half-a-pound. Then they begin to increase, and by the end of the first week the loss is made up again. This is because during the first three days the child generally does not get very much food.

Sleep.—In the first few weeks of life the child should sleep almost continually; and if healthy, it does. The usual cause of its waking is that it either feels hungry or cold. It wakes more often during the night, because the night is colder. If it be hungry, it will go to sleep again after being fed, but if cold, it will go on crying, although it has been fed. Often the mother finds out the reason of this, and to pacify the child takes it into her own bed, where the heat of her body keeps it warm. This is a dangerous practice; for the mother may go to sleep, and some unconscious movement on her part may lead to the suffocation of the child—"overlaying," as it is called. A good nurse ought not to let the mother keep the child in bed with her, but should sit by her till she has satisfied the baby's hunger, and then put the child into its cradle, first putting warm dry things on it, and taking care that it is well wrapped up, and, if the weather be cold, that a hot bottle well wrapped in flannel is put in the cradle with it.

That which the child passes with the first actions of the bowels is called **meconium**. This is the Greek word for poppy-juice, which this stuff somewhat resembles. It is thick, and greenish-black in colour. Sometimes some is passed during labour or

directly after delivery. But the more usual time for the first action of the bowels is six or eight hours after birth, and it may be delayed for twenty-four hours or more. If twenty-four hours after birth no motion has been passed, you should examine the child to see that no malformation is present; and if in doubt as to whether there be one or not, or if the child has not passed water for twenty-four hours after birth, you should seek further advice. The motions remain of the same character for from two to five days. Then they gradually alter, and become of about the colour and consistence of beaten-up eggs. A healthy child usually passes motions two to four times daily. In conditions of ill-health the motions may become green; they may be very watery; they may smell very badly, contain solid lumps of undigested matter, or be mixed with blood. If any of these conditions be present, you should inquire as to the food the child is taking. If it is being improperly fed, you should give directions how to feed it properly; and if, although properly fed, it continues ill, seek further advice. The mere fact that the stools are green is not important if the child is not ill, if it eats and sleeps as usual, and if it is not fretful.

Artificial feeding.—If the mother cannot suckle the child, great care is necessary in feeding it. The best food to begin with is cow's milk diluted with three times as much water, and sweetened. Milk is composed of water, cream, sugar, and casein. Casein is an albuminous substance: that is, one, in chemical composition and nutritive power, something like white of egg. Just as white of egg is made hard by boiling, so casein is coagulated by the juices of the stomach. Hence the casein is the part most difficult of digestion. When a child cannot digest its food properly, and vomits it up, the coagulated casein is seen in the vomit as white curds. Cow's milk differs from human

milk in containing less sugar and more casein. In consequence of this greater quantity of casein, a young infant cannot digest cow's milk. To make it a fit food for an infant, cow's milk must be diluted with two or three times as much water, and sugar added to it. A table-spoonful or more of lime-water may be added to each meal with advantage; and instead of plain water, barley-water may be used. The casein of cow's milk coagulates in the stomach in larger lumps than the casein of human milk, and is therefore more difficult of digestion. Barley-water prevents the formation of lumps quite so large as would be formed without it. Barley-water for this purpose should be an infusion, not a decoction: that is, it should be made by pouring boiling water upon the barley, and letting it cool, not by boiling the barley. Boiling water dissolves the gummy matter, which is what you want; boiling the barley brings out the starch, and this the child cannot digest. The very last drops of milk drawn from the cow contain more cream than that first drawn, and are called by dairymen "strippings," or in Scotland "afterings." This is better suited for children than the bulk of the cow's milk. Cream is quite easily digested by infants, and may be added to the food in a proportion as large as 1 to 4 without harm.

Sterilisation of milk.—Milk as it is drawn from the cow contains micro-organisms. Some of these turn the milk sour if it is kept too long. Others, we now know, cause indigestion—shown by flatulence, vomiting, and diarrhœa—and prevent children from being properly nourished by the milk. The germs of certain diseases (the principal being tubercle, enteric fever, diphtheria, and scarlet fever) may be contained in milk, and communicated to the person who drinks the milk. These mischiefs can be prevented by sterilising the milk.

The oldest and simplest way of sterilising milk is by *boiling* it. The disadvantages of boiling are that it alters the taste and smell of the milk, so that it makes it less palatable; and it alters its chemical composition in a way that makes it slightly less digestible and slightly less nutritious. These chemical changes are—(1) the casein is rendered less digestible, we know not why; (2) carbonic acid is driven off, and in consequence some lime and magnesia carbonates are precipitated; (3) fat globules coalesce; (4) a sort of skin forms on the surface—this pellicle is made of a coagulated albumin, entangling with it a good deal of fat, and thereby making the milk poorer. These disadvantages are slight, though real; but boiling milk is so simple that it probably will always hold its place as a way of sterilising milk.

The temperature at which milk boils is a little above that at which water boils. The germs in milk are killed if it be heated up to the boiling-point of water. Heating milk to this temperature, without making it boil, is what is usually meant when *sterilisation* is spoken of. The milk in a bottle is put into a kettle of water, which is then heated till it boils. To do this a kettle and bottle of suitable shape are required. The apparatus at present most used is Soxhlet's. Sterilisation produces changes in the milk like those of boiling, but to a less degree. As all that is wanted is to let the water boil, this is a simple process,

The germs can be destroyed by a temperature much less than 212° . A temperature of 160° F. is enough to destroy the germs, and affects the digestibility of the milk very little indeed. Heating milk up to this point, but not beyond it, is called *pasteurisation*, after the eminent man to whom we owe our knowledge about germs. To pasteurise milk

a special apparatus is required—a bottle with a cotton-wool plug to contain the milk, a kettle with a wire stand at the bottom to contain the bottle, and a thermometer passing through its lid. The bottle is filled with milk and the kettle with water. It is heated until the thermometer shows the temperature of the water to be 160° . Then it is taken off the fire and put under a thick cosy, and left for half an hour. Then the bottle is taken out and stood in a cool place.

Milk which has been sterilised can be given to children without dilution, and they can digest it. In England experience of this way of feeding children is as yet too small to enable us to judge whether it is better than diluting the milk.

Humanised milk.—This is a name given to cow's milk made to resemble human milk as much as possible. Cow's milk, as has been mentioned, contains more casein and less sugar than human milk. To make it like human milk we want to take out one-third of the casein and add one-third more sugar. The usual way of doing this is that devised by Professor Frankland. Let half a pint of new milk stand for twelve hours, and then skim off the cream. Put a piece of rennet an inch square into the milk from which the cream has been separated. Put the vessel in warm water at a temperature of about 100° , or near the fire, until the milk has curdled, which will be in from five to fifteen minutes. Break up the curd, and let the milk stand, and in fifteen minutes more the curd will have sunk to the bottom. Pour off the whey, boil it, and strain it through muslin. You have now milk deprived of its casein. Take one-third of a pint of it, dissolve in it 110 grains of powdered milk-sugar, and let it cool. Take two-thirds of a pint of new milk as fresh from the cow as possible, and add to it the cream which you skimmed off the milk

out of which you have taken the casein. Add to this mixture the whey as soon as it is cool.

There are in London and large towns dairies which send out milk ready sterilised and humanised, so that it is seldom that a monthly nurse will have so to prepare milk; but it is as well that she should know how to do it. But remember that no amount of boiling will make bad milk good; nor will milk, however carefully prepared, keep good in a dirty bottle.

Should the child fail to digest properly even sterilised and humanised milk, seek further advice.

Feeding.—About three or four ounces of food is a sufficient meal for an infant. If more be given, it will probably make the child sick. It should be given at about the temperature of the body—98·5°. The food should be freshly prepared each time, not allowed to stand about and get sour. The child should be fed every two hours during the day, and every four hours during the night.

Feeding-bottles.—One reason why bottle-fed babies do not thrive so well as those that are suckled, especially among the poor, is the difficulty of keeping the bottles clean. The best kind of bottle is the old-fashioned boat-shaped bottle, which has no tube, but simply a teat fastened on the spout. But this kind of bottle requires that the nurse must hold the child and the bottle all the time that it is taking food. Therefore nurses and mothers generally prefer a bottle with a flexible indiarubber tube, so that they can lay the child down and leave it to suck out of the bottle while they are busy with other things. The objection to these is the difficulty of cleaning them: there are so many joints and crevices in which drops of food may remain lodged. If this sort of bottle be preferred, the best is Day's, in which the tube and the cork are all made of one piece of indiarubber

There should be two bottles, to be used alternately, so that thorough cleansing of the bottle and tube may never be prevented by hurry. If the bottle and tube are not thoroughly clean, the drops of milk clinging about them will turn sour (from the access of micro-organisms). The most common result of dirty bottles is the production of **thrush**, a disease characterised by the presence of white spots on the inside of the child's mouth. These white spots are due to a microscopic plant, called the *oïdium albicans*. To prevent this, the child's mouth should be wiped out after taking food. After each time of using, the nurse should boil bottle, tube and teat. This will destroy any germs that may be clinging about them. Some glycerine of borax should also be applied to the inside of the child's mouth with the finger.

Ophthalmia is one of the most serious diseases that affect young infants, for it leads, if neglected, to total blindness. It is manifested first by redness of the eyes, then swelling of the lids, and yellow discharge from the eyes. Some women suffer from vaginal discharge of a kind capable—if some of the matter should enter the child's eyes—of causing this severe inflammation of the eyes. The discharge both in the woman and in the child is produced by microbes. These microbes get into the eyes, either during birth, or by contact with dirty fingers or towels after birth. Fortunately, there are not many women who at the time of delivery suffer from vaginal discharge of this virulent kind.

Prevention.—Ophthalmia is to be prevented by washing away and killing the microbes. If the mother has been suffering from a profuse yellow vaginal discharge before labour, the vagina should be washed out towards the end of the first stage of labour (that is, when the os uteri has reached nearly full dilatation) with a 1 in 2,000 solution of biniodide

of mercury. After the child is born, having cleansed its eyes as usual, as soon as your duty to the mother will permit, wash your hands clean, and dip them in the mercurial solution. Then dip a corner of a clean napkin in the 1 in 2,000 mercurial solution: hold the child's eyelids open with one hand, and with the other squeeze out a few drops of the mercurial solution into the eye, so that the globe of the eye and inside of the lids may be well washed by it. Do this to each eye.

This method does no harm, and the necessary materials for it should always be at hand; so that there is no reason against doing it. But if very virulent pus has got into the child's eyes, it is not enough. If a child is born in circumstances which make you fear that its eyes may be infected—as, for instance, when other cases have occurred in the same building—or if you think the mother has gonorrhœa, you should mention the reasons for your fear to your superior officer, and, with his approval, have ready before delivery a solution of nitrate of silver, 10 grains to the ounce, and drop this into the eyes instead of the mercurial solution. The objection to the routine use of this treatment is that it produces a little transient conjunctivitis—that is, inflammation of the thin membrane covering the eyeballs and inside of the lids. But this is the only method that has been *proved* able to prevent ophthalmia.

In any case in which signs of ophthalmia, however slight, appear, seek further advice.

Jaundice.—It is not uncommon in children a few days old for the skin to become of a yellowish colour. This is often called jaundice; but it is not true jaundice, for the motions are natural in colour. It passes off in a few days, and requires no special treatment. True jaundice, with whiteness of the

stools, is very rare in infants. If it occur, advice should be sought at once.

Swelling of breasts.—The breasts of young infants sometimes become swollen, hard, and tender, and even secrete milk. Sometimes this condition is the result of their being squeezed and rubbed by ignorant persons; or by such, treatment of this kind may be proposed for it. No such squeezing or rubbing should be done; the breasts should be protected from pressure or friction by a wool pad; and if with this the condition does not improve, further advice should be sought.

Convulsions form one of the most frequent of serious diseases in young children. It is not common for a child to have convulsions in the first two weeks of its life, and unlikely that you will be there at the precise moment when the fit comes on. But should this happen, let the child be put at once into a warm bath; and remember that the most common cause of convulsions at this early age is indigestion. Let further advice be sought, and in the meantime inquire into the character of the child's food, and stop the giving of anything unsuitable.

When to send for help . .

- ① Impaction of foetal head
- ② Contracted pelvis + face pres.ⁿ
- ③ Hydrocephalus
- ④ Deformity of child or pelvis
- ⑤ P.V. If head can't be felt.
- ⑥ When in doubt as to pregnancy.

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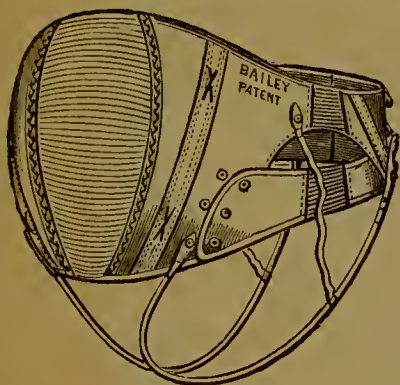
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